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# THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—42ND YEAR

SYDNEY, SATURDAY, AUGUST 20, 1955

No. 8

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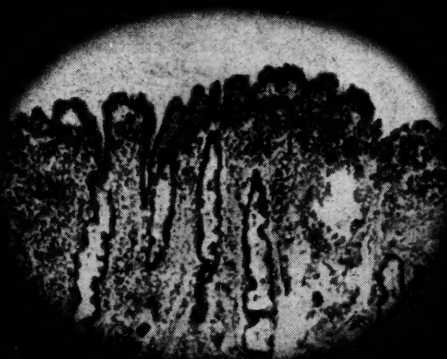
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# THE MEDICAL JOURNAL OF AUSTRALIA

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### THE LIFE AND TIMES OF DR. GEORGE BENNETT.<sup>1</sup>

By V. M. COPPLESON,  
Sydney.

THIS Post-Graduate Oration was instituted by the Post-Graduate Committee in Medicine in the University of Sydney in the hope that in remembrance of the past we might find inspiration for the future, and that it might rescue from oblivion the names of many of the pioneers in medicine in this country whose lives and work are in danger of being forgotten. Of none is this more true than of Dr. George Bennett, the subject of tonight's oration, who was a medical practitioner in this city from 1836 to 1882, and who, although now known to few, achieved in his day an international reputation.

His life was full and active, and in the short space of this address it will not be possible to give you more than the briefest outline of his remarkable career. He had a deep love of Nature. As a young man, his imagination was fired by the wonderland of science which had been revealed by the discovery and colonization of Australia. He decided to make Australia his home, and for many years he laboured with untiring energy amongst its treasures. All Nature was his domain, and every moment he could spare

from his medical practice he gave to the study of the natural history and of the fauna and flora of Australia. He discovered many new species, many of which still bear his name. He travelled far and wide seeking fresh discoveries, and sent to the Royal College of Surgeons of England, to the Royal Botanic Gardens at Kew, to the Zoological Society and the Linnean Society of London, and to the British Museum an almost continuous stream of specimens, fossils and living animals, together with detailed descriptions, observations and drawings. He was a prolific writer and an inveterate traveller. Plarr, in his book on the lives of the Fellows of the Royal College of Surgeons of England, describes him as the "Nestor of Australian Naturalists".

#### First Voyage.

Bennett was born at Plymouth on January 31, 1804. Little is known of his family or of his early life. At the age of fifteen years he was caught up "by such a wind as scatters young men through the world, to seek their fortunes further than at home", as Shakespeare puts it. He spent two years abroad, during which he visited Ceylon and Mauritius. This was the first of a number of long voyages which he made during his lifetime.

#### Medical Training.

He returned to England in 1821 and immediately began training for a medical career. He studied first at Plymouth

<sup>1</sup>The Post-Graduate Oration of the Post-Graduate Committee in Medicine in the University of Sydney, delivered on May 18, 1955, at the University of Sydney.

and then in London, and obtained his diploma of Membership of the Royal College of Surgeons of England on March 7, 1828.

#### *Richard Owen.*

During this period he began a lifelong friendship with Owen, afterwards Sir Richard Owen, who became Conservator of the Hunterian Museum of the Royal College of Surgeons of England and its first Hunterian Professor of Comparative Anatomy and Physiology. He left the College in 1856 to become the Superintendent of the Natural History Department of the British Museum. It was through his influence that the South Kensington Museum was built and opened in 1881. He was a colourful character of the same age as Bennett. He loved society, delighted in dining out and gloried in music and poetry. His fame as an anatomist became international. Thomas Carlyle referred to him as "the tall man with the great glittering eyes". He died in 1892, about a year earlier than Bennett.

#### *Second Voyage.*

Within a few months after obtaining his medical qualifications Bennett joined a scientific expedition as surgeon-naturalist on a voyage which was to occupy the next two years. He visited Australia, New Zealand and the Pacific islands, and returned to England in 1831 by way of the Philippines and Singapore.

He brought back to England with him a collection of plants which he presented to the British Museum, a live ape from Singapore, and a young native girl from the New Hebrides, named Elau, who was rescued by the crew of the ship when about to be sacrificed.

The papers in which Bennett described his observations and discoveries were numerous and the subjects many and varied. They included observations on the trees and plants of New Zealand and on the method of preparing heads among the New Zealanders. He described the monument to La Pérouse at Sydney. He wrote papers on the native girl Elau, on Polynesian dialects, on Kava, the Ungka ape, on the practice of medicine amongst the New Zealanders and the Polynesians, and on the botany and natural history of many of the South Sea and Philippine Islands. These contributions marked him as a young man of unusual merit, and for his researches he was elected a Fellow of the Linnean Society of London and a Corresponding Member of the Zoological Society.

#### *The Pearly Nautilus.*

An event of particular scientific importance was his discovery of the living animal of the pearly nautilus at Marakini or Dillon's Bay, on the Island of Erromanga, on August 24, 1829. This was the first living specimen of the animal available for description since 1602. Bennett supplied the specimen to Owen, who, for his able demonstration of it, was elected a Fellow of the Royal Society.

#### *The Kangaroo and the Platypus.*

During his short stay in New South Wales on this voyage Bennett's interest was greatly aroused by the unusual features of some of the Australian animals, and particularly by the method of generation of the kangaroo and the platypus, which was said to lay eggs. He determined as soon as possible to revisit Sydney for further research into these problems and to try to ascertain the true facts—an objective which proved much more difficult than he expected.

#### *Third Voyage.*

Bennett did not remain long in London, but set sail again for New South Wales on May 4, 1832.

During the voyage he lost no opportunity of furthering his scientific investigations. He spent days studying the luminosity of the ocean and observing the flight of flying fish. He experimented on himself with the stinging powers of Physalia, which is better known to most of us as the Portuguese man-of-war or the "blue-bottle" of our surfing beaches. He was the first to show that it feeds on fish,

a discovery which was overlooked for many years. The albatross also aroused his curiosity. He spent much time watching its flight, whilst the flight of the flying fish particularly puzzled him. On all these subjects he contributed papers to scientific journals.

As he approached the Australian coast its barren aspect disturbed him. "To an emigrant", he wrote, "one, who has left the land of his fathers, to rear his family and lay his bones in a distant soil, the first view of this, his adopted country, cannot excite in his bosom any emotions of pleasurable gratification."

#### *Sydney, 1832.*

Bennett landed at Sydney on August 25, 1832. He found Sydney greatly enlarged and improved since his previous visit in 1829. Provisions were abundant and cheap. There were many neat gardens and bright flowers. Every home had a parrot which made considerable noise screeching, babbling and whistling, and "pretty Polly" and "sweet Polly" could be heard on every hand.

It was spring when he arrived. The trees and flowers in the Domain and the country around Sydney were assuming a gay and brilliant aspect. He wrote of "The beauties of the Kingdom of Flora which are lavished so profusely in this colony". He referred particularly to the banksias, the boronias and the yellow gums. He was particularly taken by the shedding of the bark of many Australian trees, which greatly interested him.

He visited Elizabeth Bay House, the home of the Honourable Alexander Macleay, with its beautiful garden, and the small museum in Macquarie Street, which was then known as the Colonial Museum, and housed in the Council house.

#### *First Visit to the Interior.*

Bennett did not remain long in Sydney, but on September 17, 1832, he set out on horseback with a companion on a visit to the interior. Nothing of scientific interest amongst the birds, the animals, the plants or the aborigines escaped his inquisitive eye. He and his companion followed the mountain road through Springwood and Blackheath. The magnificence of the scenery increased as they descended the pass at Mount Victoria on which an iron gang was still at work. They proceeded as far as Wallerawang and Cullen Bullen, and returned home through Mittagong, arriving back in Sydney in October.

During this journey Bennett secured his first specimens of the platypus. Amongst these was a living female platypus which he had dug out of its burrow. He decided to return to Sydney with it, hoping that it would give him the answer whether or not the animal laid eggs. He started back to Sydney on horseback on a journey of some 200 miles carrying the animal in a box. He looked after it with great care, but it escaped one night as he passed through Mittagong. This was a great disappointment to him, and he determined to make a further attempt as soon as possible to obtain another living specimen.

#### *Second Inland Tour.*

He left Sydney again on November 8 and took the route through Mittagong, Goulburn and Yass to Tumut, where he was particularly interested in the Bogong moths. He obtained near Yass numerous specimens of the platypus, none of which lived; but eventually he succeeded in obtaining a live grown female and two young ones, a male and a female, with which he started back on his return journey. The grown female died on the journey, but he brought the young ones back alive to Sydney, where he kept them as pets. They were at first happy and playful, but they lived only five weeks. At this stage Bennett began a correspondence with Owen which continued for the rest of their lives. The first letter was written as one of the young platypuses was playing in the room.

#### *1833 to 1835.*

Bennett dispatched a large number of specimens to Owen, and left for England on March 14, 1833. The voyage



took over a year. He visited Sumatra, Macao, Hong-Kong and Singapore, and arrived in England on May 5, 1834.

The whole of this voyage and his expeditions into New South Wales he described in detail in his first book, entitled "Wanderings in New South Wales, Batavia, Pedir Coast, Singapore and China". The book is written with the freshness and vigour of youth, and with an erudition and command of good English which are rarely equalled by young medical men of today.

During his stay in England he was awarded the Honorary Gold Medal of the Royal College of Surgeons of England for his discovery of the pearly nautilus and for his preparations illustrating the developmental history of the kangaroo and ornithorhynchus. This was a signal honour. He also contributed a series of papers to the Zoological Society of London on a number of subjects, including the king penguin, the wandering albatross and the natural history and habits of the platypus.

He left England again about March, 1835, and arrived back in Sydney on July 30. He did not see his native land again for over twenty years.

#### *The Sheep Disease.*

Soon after his arrival in Australia Bennett was appointed by the New South Wales Government to investigate a disease which was causing great havoc amongst the sheep of the colony and was threatening its wealth and resources. It was a serious disease, and its virulence can be judged by its high mortality. On the station of Robert Campbell, of Boorowa, for instance, of 3200 sheep, 2500 died. Bennett in his report pronounced the disease to be "epidemic catarrh or influenza".

#### *The Australian Museum.*

Before Bennett left England he had received an appointment from the Secretary of State for the Colonies to the Museum, which was now known as the Australian Museum. He soon set to work collecting, classifying and arranging the specimens, and preparing a catalogue, which was published in 1837.

Bennett attracted donors of specimens from far and wide, amongst whom were Mitchell, Sturt, the explorer, Alexander Macleay, the Colonial Secretary, and Charles Coxen.

His association with the Museum continued for many years. He was its first secretary, and he served as director and then as curator until 1841. After this, he was a member of the Museum Committee from 1838 to 1853, when he was appointed a trustee until he resigned twenty years later.

#### *The Sydney School of Arts.*

About this time he was also for a short while associated with the newly formed Sydney School of Arts, which was the first attempt at adult education in the colony, and the first subscription library. Courses of lectures were held, to which Bennett contributed the lectures on zoology.

#### *Early Medical Practice.*

During the years when he was secretary and curator of the Museum, Bennett carried on his medical practice part-time. He refers to it occasionally in letters to Owen. For instance, he wrote to Owen in 1836 that he was practising surgical operations on hanged subjects, of which there were not a few: "five last week", he wrote, "and perhaps the same number next". In 1839 he wrote about a special aneurysm needle he had designed for the treatment of a patient with an aneurysm of the innominate artery. Whether he actually carried out the operation or not is doubtful.

#### *The Bennett-Owen Documents.*

The letters which Bennett wrote to Owen during this period are still preserved in the Owen Archives of the Royal College of Surgeons of England, and through the kindness of the College and the assistance of Mr. LeFanu, the College librarian, copies of these letters and other documents have been made available to me.

One of these is a document in Owen's handwriting, dated May 17, 1834, which sets out a list of over 500 specimens which Bennett sent to Owen, and concludes with a glowing tribute to Bennett for his detailed and valuable descriptions.

Another consists of "Notes on the Habits of the Spermaceti Whale and on the *Delphinus* or Killer". Bennett's knowledge of whaling appears to have been considerable.

There are also thirty letters from Bennett to Owen, written between February, 1833, and April, 1840. The last was written shortly before he severed his active association with the Australian Museum.

These letters disclose that Owen used to send Bennett boxes or tubes to fill with specimens. Bennett usually returned them in the care of surgeons of naval or convict ships, and in particular of a Dr. McTernan. The greater part of these letters is devoted to a description of the specimens with comments and minute details concerning them.

Owen appears to have been a very bad correspondent, for he sent no more than three replies to Bennett's thirty letters. Bennett continually complains of this in his letters, and of his scientific and intellectual isolation.

#### *1841 to 1856.*

The reduction of Bennett's salary at the Museum to £100 per annum in 1841 was a turning point in his career. It compelled him to forsake the paths of science for medicine and to exchange his scientific pursuits for more practical means of supporting his family. He was then aged thirty-seven years. He resigned his appointment as curator of the Museum, and for the next fifteen years he devoted his time and energy almost exclusively to his practice. He stopped sending specimens to Owen and he closed his regular correspondence with him. He contributed nothing to medical or scientific journals. He did write one letter to Owen on February 20, 1844, about some bones he had seen of a gigantic bird from New Zealand, the moa, which a sailor had given to Dr. McKellar, of Sydney. He also wrote to Gould, of whom he was very fond and whom he knew very well. Gould's work on the Australian birds is outstanding. He was the same age as Bennett and Owen, and collaborated with them all his life. Gould's books on the birds of Australia are rightly famous. They are as fine a production as can be imagined, and as beautiful a series of books as has ever been produced in any language. Bennett later in his life presented a complete set of Gould's works to the Fisher Library, where they now rest.

Amongst Bennett's friends during this period of his life were several artists, including G. F. Angas, who was later secretary of the Museum, Conrad Martens, who had arrived in Australia in 1835, about the same time as Bennett, and Oswald Brierley, the marine painter. He bought some sixteen of Martens's paintings, a number of which are still in the possession of his descendants. He was also attached to Ludwig Leichhardt, the explorer. Bennett had a bust of Leichhardt modelled and presented it to the Medical School.

Bennett married a Scotch girl named Cameron on November 26, 1835. They had two boys, George Frederick and William, and three girls, Elizabeth, Alice and Edith. Of his granddaughters, Mrs. Amy Hetherington, a daughter of his eldest son George, lives in Queensland, and Miss Bennett, the daughter of his son William, lives in Sydney. His wife died and he married a second wife, by whom he had a son, Frederick, whom he also called Owen after his friend. His second wife died in 1853.

#### *1856 to 1859.*

After the death of his second wife his thoughts again turned to science, which became the vicarious outlet of his sorrow. The spark which rekindled the smouldering fires of his scientific spirit appears to have been a letter from Sir William Hooker informing him of the formation of a new section at the Royal Botanic Gardens at Kew. He

inquired about Bennett's papers on botanical subjects and asked him to forward specimens. Bennett, in his reply, said that his "professional avocations" prevented his devoting as much time to science as he would desire, but that he would do all he could to assist him.

I am indebted to Sir Edward Salisbury, Director of the Royal Botanic Gardens at Kew, for copies of this letter and other correspondence, and to the Linnean Society of New South Wales for some of the return correspondence.

In 1856 Bennett began again in earnest to send specimens to England. He resumed his correspondence with Owen. Within a year he was writing regularly and frequently; he forwarded many specimens and drawings of birds, animals, fishes and fossils. He repeatedly informed Owen of his intention to resume his researches on the platypus, and about this time he began preparations for the publication of a new book on the natural history of Australia.

Bennett's home was characteristic of him. It was a combination of a picture gallery, a miniature museum and a private zoo. The rooms were full of stuffed animals and birds, and the walls were everywhere covered with pictures. It was his ambition to rear a platypus, but he never succeeded. Amongst the birds he reared was a mooruk, which he obtained from a sea captain; it was an unusual bird, a new type of cassowary, which had been procured from the natives of New Britain. Bennett sent descriptions and drawings of this bird to Gould, who laid them before the Zoological Society of London and named the bird *Casuarus Bennettii*, after him. Bennett kept the bird for some time at his home, and eventually sent it with two younger ones to the London Zoo.

I have received much valuable information concerning this and the subsequent period of his life from sixty-seven letters which he and his son George wrote to Owen between 1844 and 1888, and which are in the possession of the British Museum; copies have been kindly made available to me.

In 1859 Bennett again visited England by what was then known as the overland route, and remained there about a year. He attended a meeting of the British Association for the Advancement of Science at Oxford, and read a paper at a meeting in Aberdeen on "Vegetable Ivory". He was elected a Fellow of the Royal College of Surgeons of England and an Honorary Doctor of Medicine of the University of Glasgow. He published in England his book "The Gatherings of a Naturalist", a most interesting book, which is quoted today in scientific writings, and still gives one of the best descriptions extant of the fauna and flora of Australia.

On the voyage back to Australia Bennett met Miss Sarah Adcock, who became his third wife. They had two children, both of whom died in infancy. Miss Gabrielle Brennan, of Bowral, and Mrs. N. Donkin, of Sydney, are her great-nieces.

On his return to Australia Bennett resumed his former correspondence and sent many specimens to Owen, to Sir William Hooker, to Gould and to the Zoological Society. During the next twelve years he sent many living birds and animals to the London Zoo. Amongst these were the kagu from New Caledonia, the tooth-billed pigeon or little dodo, Eyton's tree duck, the New Caledonia rail, the wood hen rail from Lord Howe Island, the Tasmanian devil, the Tasmanian wolf, curlews, hornbills and the Australian bustard. The Zoological Society of London, in recognition of his services, elected him a Fellow in 1862 and awarded him their silver medal.

#### *The Acclimatization Society.*

Bennett was apparently very impressed whilst abroad with the work of the acclimatization societies, and soon after his return he gave a lecture in the Australian Library in Bent Street on acclimatization and its adaptation to Australia. His Excellency the Governor, Sir John Young, took the chair, and on the platform were many eminent men. The hall was full to overflowing before the lecture began, and many were turned away. Bennett's address was illustrated by coloured drawings on the walls. On the

table were stuffed birds and animals. In cages were live specimens of the porcupine, the kangaroo rat and the native bear, whilst branches of the rice-paper plant and other plants were exhibited. The Melbourne Acclimatization Society afterwards published the lecture and distributed many copies of it. They awarded him their silver medal as "a token of the high esteem entertained for him as one of the greatest living naturalists". The New South Wales Acclimatization Society was formed in 1861, and the Government provided it with an annual grant of £1000. Bennett was its genius. He presided over its destiny and nursed it with much time and energy.

The objects of the society included the introduction, acclimatization and domestication of animals, birds, fishes, insects and vegetables, both useful and ornamental, and the preservation from wilful destruction of birds and other innocuous animals. Its main objective was to increase the supply and variety of food in the colony. The society introduced pheasants, ducks, geese, swans, pigeons, fowls, deer, goats, hares, sparrows, skylarks, sugar-cane, flax, jute, cocoa, tobacco, silkworms and many other plants and animals. These were distributed to the various members of the society for care and upkeep. A herd of alpacas and many other animals and birds were kept in Parramatta park. The society, which at first made good progress, languished and was disbanded in 1871.

#### *Silk and Oranges.*

After the society ceased to exist, Bennett became interested in the cultivation of silk in New South Wales, and carried on a lengthy correspondence with India and the Japanese on the subject, and received from them full information and a collection of choice eggs to found an Australian silkworm industry. He also took an interest in the introduction, cultivation and economic uses of the orange and other fruit of the citrus tribe, and published papers on the subject.

#### *1860 to 1886.*

Bennett's genius was slow to decline, and although he was now sixty-seven years old, the next ten years of his life were years of great scientific activity.

He wrote prodigiously on scientific and medical subjects, although his literary style was now more the descriptive style of the scientist and lacked the lightness of his earlier years. He published a translation of d'Alberty's account of his journey to the Arfak Mountains in New Guinea and of his exploration of the Fly River. He wrote papers on the platypus, on the echidna, on many birds, plants and animals, and on other subjects. His bibliography is amazing for his age. He continued with increased activity his correspondence with Owen. He was again imbued with the wanderlust, and he undertook four trips: the first to the Darling Downs, Queensland, in 1871; the second to Tasmania, Melbourne and Adelaide in 1875, and a round-the-world trip to England through the United States and Canada in 1877-1878, from which he returned by the Continent, Colombo and Bombay. He spent six weeks in New Zealand in 1881 and visited Melbourne and Norfolk Island.

The diary of his round-the-world trip, which is written in much detail, is of great interest and is still in the possession of Miss Brennan. As a tourist he showed great energy. Wherever he went he visited the museums and attended scientific gatherings. He went to the theatres, the ballet and the opera. He was invited to innumerable dinners, conversaziones and social functions. He invariably explored art galleries, castles, cathedrals and other places of interest, and never missed a visit to the cemetery or the tombs of the great. During the tour he met many notable people, including Brigham Young, Owen, Paget, Spencer Wells, Stanley the explorer, George Eliot, and many others.

Soon after his return to Australia in 1879 he represented the Ceylon Government as Executive Commissioner at the Sydney International Exhibition, and disposed for them of over 1000 pounds of Ceylon tea, which at that time was little known.

It was not until his eighty-second year in 1886 that he began to slacken off his scientific activities; but even then his mental faculties remained remarkably clear.

#### Medical Practice.

In spite of his passion for natural history, Bennett achieved a large and lucrative medical practice. He was freely consulted by his fellow practitioners, and his views and opinions on medical subjects were quoted on frequent occasions in *The New South Wales Medical Gazette*. He wrote extensively on medical subjects in journals, both at home and abroad, on the intermittent fever of the island of Erromanga, which we now know to be malaria, on the practice of medicine amongst the New Zealanders, on tetanus and on the poisonous toad fish, and he wrote a number of papers on *materia medica*. With a Beckett and Bedford, he was one of the consultants at the bedside of the dying Bland, and his opinion was sought in connexion with the death of Ben Boyd, a picturesque figure in colonial life, who was lost on Guadalcanar. In his early days he hoped to obtain an appointment on the staff of the Colonial Hospital at Liverpool. He was disappointed in this; but in 1874, in his seventieth year, he became the first consulting physician to Saint Vincent's Hospital, Sydney.

In Bennett's paper on tetanus in *The New South Wales Medical Gazette* he records the histories of four patients whom he treated in Saint Vincent's Hospital; three of them recovered. This is no mean feat even in these days. However, the dawn of modern medicine had scarcely appeared over the horizon in Bennett's day, and he did not live to see medicine emancipated from empiricism.

#### Association with the University.

Bennett was also for many years associated with the University of Sydney as a teacher, and was one of the first members of the Faculty of Medicine and a member of the first Board of Examiners. He continued as lecturer in *materia medica* until his death. Bennett, Dr. J. C. Cox, who himself was a keen naturalist and collector of shells, and Normand McLaurin were the last medical men in New South Wales who had the privilege of having apprentices indentured to them for medical training. He gradually relinquished his practice to his younger and more active associates, and in 1882 he retired from practice to devote the remainder of his days to the full and uninterrupted enjoyment of his beloved science.

#### The Queensland Fossils.

The matters which lent most colour to his later years were the Queensland fossils and the birth of the marsupials and monotremes. His interest in the extinct animals of Australia dated from the time of his earliest arrival, and fossil bones from Wellington Caves were amongst the first specimens he sent to Owen in 1833. Shortly before Bennett arrived in Australia, Mr. George Rankin, of Bathurst, had discovered a vast accumulation of fossil bones in cave earth deposits in the Wellington Caves. Major Mitchell visited the caves in 1830 and sent a large collection of the bones to Owen, who wrote a description of them in Mitchell's book. The fossils proved to be the bones of marsupials, of the Tasmanian wolf (*Thylacinus*) and of the Tasmanian devil (*Sarcophilus*). At the time the wombat, which was first described from these bones, was believed to be an extinct animal. Fossil remains were also found of two extinct animals which were to be the subject of controversy and search for the next hundred years. These were the giant marsupial (*Diprotodon*) and the marsupial lion (*Thylacoleo*). Bennett played a major part in the search for the missing fragments needed for the reconstruction of their skeletons and several fossils were named after him.

Owen also undoubtedly inspired Bennett's trip to the Darling Downs, Queensland, in 1871. Bennett's eldest son, George Frederick, accompanied him. They found a rich harvest of fossils in drifts and Pleistocene alluvial deposits where they had been washed by floods, and enlisted the help of a number of local station owners, notably Mr. King,

of Gowrie Station, and others, whom they instructed how and where to find the fossils. They were later responsible for sending Owen and Bennett some very valuable specimens.

Bennett himself wrote very little on the subject of fossils. His main contribution was that of a field worker, or really the leader of a group who made their findings available to Owen. Owen in his monumental work "*Researches on the Fossil Remains of the Extinct Animals of Australia*" acknowledges his debt to Bennett, and in his preface pays him a special tribute.

Bennett's son George continued to explore this area for fossils, and was rewarded by finding in 1880 the head and feet of a large animal, which was referred to in the correspondence as the "horned dragon". This was *Meiolania*, a giant horned turtle. In spite of the most careful and exhaustive search, no trace of the intervening body was ever found.

Since the times of Bennett, Owen and Bennett's son George, little further work has been carried out on the extinct vertebrate animals of Australia. It is only within recent years that scientists have begun to take an interest in the subject. A group of American palaeontologists from the University of California recently visited the Darling Downs and obtained many fossils from the areas in which Bennett and his son had sought them, and returned to the United States to examine them.

#### The Birth of the Marsupials and the Monotremes.

However, the problems to which Bennett gave the most persistent thought and attention were the mystery of the birth of the marsupials and the monotremes—the two problems which first attracted him to Australia. Even today there are many Australians who are unaware of the unusual features of these subjects.

In the case of the kangaroo and the marsupials the problem was to explain how their young at an immature stage of fetal development came to be found in the pouch firmly attached to the mother's nipple. For many years bushmen and others believed that the kangaroo was actually conceived in the pouch. This, however, is impossible and was disproved by Bennett as early as 1832, when he sent to Owen specimens of the fetal kangaroo in the uterus. The general view at the time was that the foetus was born in the usual way when very small, and that its transfer to the pouch was made by the mother, who assisted it either by her paws or, as Owen believed, by her lips. Not until about twenty years after Bennett's death was the matter satisfactorily solved. It was then shown that the foetus during its period of development in the uterus, which in the case of kangaroos in captivity is about five weeks, has a precocious development of its forelimbs and sucking apparatus. It has been observed on many occasions slowly crawling unaided up its mother's body, using a sort of overarm stroke as if swimming, and with unerring instinct finding and attaching itself to the nipple.

The second problem to solve was the secret of the birth of the monotremes, particularly the platypus. Bennett continued to seek this with great perseverance, and although he came very close to its solution, his enterprise and persistence were not rewarded.

The platypus is a unique animal, and no animal, on its first introduction to Europe, gave greater doubts as to its classification or excited deeper interest amongst naturalists. As early as 1802, Everard Home had demonstrated that the oviducts of the female platypus, instead of uniting to form a uterus, as in the majority of mammals, opened separately into a cloaca, as in birds and reptiles. This raised doubts whether it should be regarded as a mammal, and eventually it was placed with the bush porcupine, otherwise known as the echidna or the spiny ant-eater, in a new vertebrate class, the Monotremata. There were divergent views concerning its method of bearing its young. One view, which had been expressed by Everard Home in 1802 and by Sir John Jamison in Sydney in 1817, was that the animal laid eggs which were hatched outside the body—



that is, that it was oviparous. This view at the time was dismissed for lack of scientific backing. The other view, which was held tenaciously throughout by Bennett and Owen and generally accepted by naturalists, was that the animal was ovi-viviparous—that it is, that it produced eggs which were hatched inside the body before or during parturition, and that the young were born alive. The third possibility, that the animal was viviparous and that its young were born in the same way as in other mammals, was disproved by the specimens Bennett obtained in 1832.

These were the problems which exercised Bennett's mind. He tried many times to domesticate the platypus so as to learn the secret, even to the extent of planning artificial burrows, but he never succeeded.

The specimens which he obtained on his first trip into the interior, and which he sent to Owen, showed the presence of loose eggs in the genital apparatus. In spite of years of endeavour, Bennett was never able to bridge the gap between this and the young he found in the burrows. The gossip that the animal laid eggs still persisted. Many bushmen and aborigines supported it. However, no one was ever able to produce a platypus egg, although the curator of the Museum, Mr. Gerard Krefft, used at intervals to advertise an offer of £50 for one.

Throughout the years Bennett's failure to solve the problem obsessed him. He constantly refers to it in his letters to Owen. After his visit to Queensland in 1871, he employed his son George, who was married and then living in Toowoomba, to observe the breeding habits of both the platypus and the echidna, to obtain specimens, and to dig out the platypus burrows, and on his return from England in 1881 he wrote to his son, urging him with eagerness and impatience, to spare no expense in his efforts to solve the riddle.

#### The Solution.

However, it was not until 1884 that the solution was found by W. H. Caldwell, a young zoologist from Cambridge. Caldwell had come to Australia the year previously on a travelling fellowship, bringing with him special gear and equipment for the express purpose of studying these problems, and also the remarkable lung fish, *Ceratodus*.

In September, 1884, Caldwell telegraphed to Professor Liversidge, of the University of Sydney, and to Bennett, from the Burnett River in central Queensland, that he had proved that the monotremes laid eggs and were oviparous. The information was cabled to the meeting of the British Association for the Advancement of Science, which was then in session in Montreal, where it was received with great interest and was telegraphed all over the world. It was announced in the *Sydney Morning Herald* of September 6, 1884. Three days later, a letter appeared from Bennett, in which he complained that his view had been misrepresented, that he had never considered the animal viviparous as stated, but that he and others from the time of his discovery of the ova in the uterus in 1834 had concluded that "these animals would eventually prove ovi-viviparous".

So closed one of the most interesting chapters in the scientific life of Australia. Bennett's observations were accurate, but his inferences were wrong. However, his original work in 1832 paved the way for the final solution. Burrell, in his well-known book "The Platypus", attributes Bennett's failure to his adoption of the aboriginal method of opening the burrows and thus missing some important features. Bennett's private reactions are disclosed in his letters. They were naturally ones of disappointment. He wrote as follows to Owen on September 10, 1884: "We must now await with patience for Mr. Caldwell's able development of the mystery and it will be of the greatest interest to many but to none more than ourselves." In November, 1884, he wrote: "Who could have thought that an animal with so large a milk gland should actually demean itself by laying small white eggs." Finally, in 1888, he sent Owen the egg of an echidna, with a note stating: "This is the state in which I have been seeking the platypus for many a long year."

Platypus eggs are now well known. They are compressible, but not brittle, and more like the eggs of a serpent than of a bird. They are actually laid. The mother coils her body around the eggs, and the hatching period takes about fourteen days.

#### Conclusion.

During his latter years Bennett became the patriarch of Australian science. He was elected president of the New South Wales Zoological Society in 1882. In 1888 he became president of the Natural History Association, and was reelected president in 1891, when it was renamed the Field Naturalists' Society of New South Wales. He received many honours at home and abroad, and in December, 1890, when he was eighty-six years of age, he was awarded the Clarke Memorial Medal by the Royal Society of New South Wales; this is bestowed "for meritorious contributions to the Geology, Mineralogy or Natural History of Australia by men of Science, whether resident in Australia or elsewhere".

Bennett was an ardent bibliophile and owned one of the best libraries in Australia. He presented many valuable books to the Fisher Library. There was great competition for his books when his library was dispersed after his death, and many found their way to the Mitchell collection. In 1890 he presented a stained glass window to the Medical School. This window still frames the southern door of the Old Medical School. It portrays the coats of arms of Bennett, Anderson Stuart, Normand MacLaurin and other famous men whom Bennett knew well, including Spencer Wells and Paget.

Bennett died of pneumonia on September 29, 1893, at his home in William Street, Sydney, at the age of eighty-nine years. He was attended in his last illness by Dr. William Goode, an ex-naval surgeon on the staff of the Royal Prince Alfred Hospital, and was examined twice in consultation by Dr. Robert Scot Skirving, who is responsible for suggesting Bennett's name for this oration. Obituary notices were published all over the world and many tributes were paid to him.

So ended the life of Dr. George Bennett, the greatest of the physician-naturalists of Australia. Although medicine was his profession, his dreams were of science. He was the Australian counterpart of his great English contemporaries Owen, Hooker and Gould, and his contributions to the expansion of the scientific knowledge of Australia have well earned him a place with Joseph Banks and Alexander Macleay amongst the outstanding pioneers of natural history in this country.

#### PRIMARY ACUTE INFLAMMATION AND PRIMARY IDIOPATHIC INFARCTION OF THE GREAT OMENTUM.

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PRIMARY acute inflammation of the great omentum is a localized area of acute non-specific inflammation for which no cause can be found. Primary idiopathic infarction of the great omentum is an area of infarction, again for which no cause can be found. In the literature on these subjects it is found that many authors have confused three lesions of the omentum, namely primary torsion, idiopathic infarction and acute inflammation (for instance, Kovacs, 1941; Hallstrand, 1954). Two cases of supposed acute epiploitis reported by Hubbard and Morris (1942) were, according to the histological reports, actually cases of infarction, and a similar mistake occurred in a case reported by Chatzkelson (1934). It confuses the subject still further when some authors (for instance, Pereshivkin, 1921; Lukanov, 1940) discuss epiploitis as following torsion when the condition is actually an infarction secondary to the torsion.



### Primary Acute Inflammation of the Great Omentum.

CASE I.—The patient, a married woman, sixty years of age, had had no previous illnesses except for recurrent appendiceal colic, for which appendicectomy through a McBurney's incision was performed five years previously. For the eight weeks prior to her admission to the Royal North Shore Hospital she had had a continuous, aching pain at the left of the umbilicus. Three days prior to her admission to hospital this pain became very severe and she vomited several times, without relief of the pain. Her bowels had been well open until the onset of the acute pain; since then she had been constipated. Investigation by barium meal and enema a week before her admission showed a normal gastro-intestinal tract. Examination disclosed a pale, sick woman whose tongue was furred. Her temperature was 101° F., her pulse rate was 100 per minute, and her respiratory rate 20. Her blood pressure was 200 millimetres of mercury, systolic, and 120, diastolic. The significant physical findings were found in the abdomen, where there was a diffuse, tender mass about three inches by four inches in extent at the left of the umbilicus. It was mobile and moved a little on respiration. The red blood cells numbered 4,500,000 per cubic millimetre. The haemoglobin value was 14%. The leucocyte count was 8100 cells per cubic millimetre; 89% were neutrophile cells, 2% eosinophile cells and 11% lymphocytes. On exploring the abdomen there was first seen some sero-sanguineous fluid. There was a large, red, acutely inflamed mass localized in the upper and left part of the great omentum, involving all its layers. It was three inches by four inches in extent and two inches thick. It was firm, but friable in consistency. Its edges shelved into normal omentum on all sides. It was separated from the transverse colon, the descending colon and the stomach by at least two inches of normal omentum. There was no evidence of any cause. As the lesion was in the left upper portion of the omentum, obviously it had nothing to do with the previous appendicectomy. The mass was excised and the patient had an uneventful convalescence. Microscopically, the specimen was seen to be composed of adipose tissue with acute non-specific inflammatory changes. No giant cells or crystals were present. There was no necrosis. An investigation of the patient two years later showed that there had been no further abdominal symptoms.

This condition was first described by Eitel (1899); according to Bredahl (1950) it is very rare. Though Ficarra, (1953) describes idiopathic omental infarction, he does not mention acute primary inflammation of the great omentum.

No notice can be taken of the incidence of this disease as described in the literature because of the confusion, not only between primary inflammation, torsion and infarction of the omentum as already mentioned, but also between primary and secondary inflammation (Prutz, 1913). Also, little notice of figures in the American or English literature can be taken, because rarely do the writers mention European, Russian or South American literature. In these countries the condition seems to be commoner than in English-speaking countries.

The aetiology is unknown. However, Roulaux (1927) states that it is due to impaired blood supply. This is an example of confused thinking, for surely impaired blood supply would lead to infarction rather than inflammation. The condition does not follow torsion, in which necrosis due to lack of blood is the result; yet Eliason and Johnson (1939), in an article entitled "Primary Acute Epiploitis", mistakenly applied the term "primary acute epiploitis" to the secondary necrosis of the omentum resulting from torsion. Pablo Caccia (1941) and Petticlerc and Gauthier (1947) thought their cases were due to a microbial infection in the blood-stream, but unfortunately they did not culture the diseased epiploon.

Complications may ensue; for instance, suppuration may cause an abscess (Mora, 1947), which may rupture through the abdominal wall or even into the bowel (Kalminovsky, 1944). According to Kovacs (1941), lack of treatment may result in a large tumour (which he calls "Schloffer's tumour"), examination of which shows chronic inflammation only.

### Primary Idiopathic Infarction of the Great Omentum.

CASE II.—A married woman, aged fifty years, at the age of twenty-eight years, had had both Fallopian tubes and ovaries and her appendix removed, apparently for chronic salpingo-oophoritis, through a lower mid-line incision. At

the age of thirty years she commenced to have recurrent attacks of biliary colic, for which her gall-bladder was removed six years later. The operation, performed through a right upper paramedian incision, revealed many small gallstones in a chronically inflamed gall-bladder. The common bile duct was not explored, as there was apparently no indication for doing so. She was then well for the next fourteen years, when, seven weeks prior to her admission to the Royal North Shore Hospital, she commenced to suffer from attacks of severe biliary colic with slight jaundice.

On her admission to hospital just after such an attack she was seen to be slightly jaundiced. Her temperature, pulse and respiratory rates, and blood pressure were normal. Abdominal examination disclosed some tenderness in the epigastrium. Operation was performed through the previous right upper paramedian incision. Numerous adhesions were found in the upper part of the abdomen; they were especially numerous between the duodenum and the gall-bladder bed. The liver and the portal vein were normal in appearance. The common bile duct was dilated and full of bile mud, but no calculi were present. It was opened and the mud was washed out. The duct wall was sutured and a tube was inserted down to the suture line and brought out through a stab-wound. The rest of the abdomen was not explored. The great omentum was not seen in the operation field. Convalescence was normal for one week; the tube drained a little bile for two days only; it was then removed. The patient then commenced to have an irregularly raised temperature, ranging from 98.4° to 100° F. She also had a constant boring pain all over the lower part of the abdomen; this pain radiated down the anterior aspect of the right thigh. No abnormality was found on examination except some vague generalized abdominal tenderness. The white cell count was 12,000 per cubic millimetre; 80% of the cells were neutrophile. The pain gradually became worse, but it was not until one month after the operation that it was possible to feel a large, slightly tender mass extending from the mid-line of the lower part of the abdomen across to the right iliac fossa. Operation through a lower right paramedian incision then revealed a large mass in the great omentum involving the whole of its lower right segment. At no place was it in contact with bowel. The reddish mass was excised, and when examined was found to contain a cavity full of milky fluid in which globules of fat were interspersed. Floating in the fluid was a large piece of grey, necrotic, evil-smelling omentum. Culture of this fluid later showed that it was sterile. There was no omental twist, and no other cause of the infarction was apparent. Pathological examination showed that the loose piece of material was a necrotic piece of adipose tissue with a few inflammatory cells only. No giant cells were present and there was no evidence of crystals, sutures or other foreign bodies. When examined eighteen months later, the patient was found to have been well, with no further evidence of abdominal trouble, nor had there been any further pain in the right thigh.

This condition was first described by Buch in 1896; it is rare, though it is said to be less uncommon than primary inflammation. However, as already mentioned, the literature is so confused that no notice can be taken of reported numbers.

Here again the aetiology of this infarct is unknown, nor is it known whether these primary infarcts are due to arterial infarction or venous thrombosis. There was no evidence in this patient of any tendency to intravascular clotting, which Dew (1953) describes as a prelude to post-operative thrombosis of vessels such as the pulmonary artery.

Totten (1942) suggests increased intraabdominal pressure as a cause, but that is mere speculation.

### Discussion.

The cause of both these primary conditions is unknown. They must not be confused with inflammation or infarction secondary to known causes.

Secondary omental inflammation may follow previous ligation, such as is performed during herniorrhaphy with omental resection (Prutz, 1913). It may be a complication of abdominal trauma or of diverticulitis. It may be due to a foreign body such as a fish bone (Schwartz, 1929; Sokolov, 1933) or vegetable fibres (Nylander, 1933) penetrating from the bowel lumen. In fact, Elfving and Schienen (1952) and von Oppolzer (1939) believe that many of the idiopathic cases recorded in the literature

were actually due to unrecognized foreign bodies, though they give no evidence to support this statement.

Secondary infarction may follow torsion of the omentum, or thrombosis in the portal venous system (Hines, 1934; Berger, 1938), or interference with the blood supply of the great omentum after partial gastrectomy (Lake, 1948).

Clinically it is impossible to differentiate between primary acute inflammation of the omentum and idiopathic infarction. Whilst the former is completely inflammatory, on the latter there is superimposed surrounding secondary inflammation from the healthy omentum, so that in each instance the clinical result is the same. If either lesion is on the right side of the omentum, especially low down, where most recorded cases occur, then acute appendicitis is likely to be diagnosed if the appendix has not already been removed (Pablo Caccia, 1941; Thévenard, 1931).

In both these lesions there is usually a long history of raised temperature with abdominal pain and tenderness. In most instances a palpable mass develops in the abdomen. At operation there is found in each condition a localized tumour in the omentum, separated from the bowel by a strip of normal omentum. At first sight both masses look like localized areas of acute inflammation; it is not until they are dissected that the infarct is seen in the middle of the specimen of idiopathic infarction.

In later cases of infarction, as in the case reported here, the infarct may be completely separated and lying free in a cavity in the omentum. However, in early cases it may be impossible, as pointed out by Schomberg (1929), to differentiate macroscopically a hæmorrhagic infarct from an area of acute inflammation.

The treatment in both types of case is merely excision of the affected area; for this operation the mortality is said to be 1% (Aimes, 1920). However, it has been recorded that bowel has been unnecessarily resected in such instances (Sokolov, 1933).

The prognosis in both lesions must be guarded because, as the cause is not known, there is no telling whether or not either will recur. However, no instances of recurrence have yet been recorded.

### Summary.

Cases of primary inflammation and primary idiopathic infarction of the great omentum are described and discussed.

Attention is drawn to the similarity of the clinical pictures and it is pointed out that it rests with the pathologist in most instances to differentiate between these conditions.

It is pointed out that there is much confusion between these conditions in the literature, so that the accuracy of the recorded numbers of either lesion cannot be relied on.

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### THE EXCRETION AND RETENTION OF INGESTED LITHIUM AND ITS EFFECT ON THE IONIC BALANCE OF MAN.

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LITHIUM SALTS have been used in the treatment of arthritic conditions, and as salt substitutes in cardiac and related conditions where lowered sodium intake appeared to be indicated (Hanlon *et alii*, 1949; Corcoran *et alii*, 1949). Cade (1949) and Noack and Trautner (1951) claimed to have achieved beneficial results in cases both of simple nervous excitement and of maniacal agitation. Their results were confirmed by Duc (1953), by Glesinger (1954), by Schou (1954) and others. The treatment is controversial, largely owing to the occasional occurrence of grave toxic complications. We consider that these incidents can be avoided if a better understanding of the mode of action of lithium allows a better selection and observation of the cases.

It appears from the literature that it is mainly the effects of high, rapidly or slowly lethal doses that have been investigated (Radomski *et alii*, 1950; Foulks *et alii*, 1951). These doses lead to grave sodium, potassium and water depletion and, to a lesser degree, to a loss of sulphate and phosphate; the animals die with clinical symptoms of dehydration and inanition, hypopotassemia and hyponatraemia. We investigated the effect of moderately large doses of lithium salts on the ionic balance of ourselves and of patients, particular attention being given to those laboratory tests which may assist in a safe control of therapy and an early recognition of imminent or potential toxic complications. In view of the number of assays involved even in a single experiment of a few days' duration, the present work was confined mainly to the determination of lithium, sodium, potassium and chloride ions. Clinical observations are reported, in so far as they seem to modify the interpretation of the results obtained in the healthy, or to indicate promising lines of more detailed investigation. No extensive clinical discussion is intended in the present context.

#### ASSAYING PROCEDURE.

Sodium, potassium and lithium were determined by a Beckman model DU quartz spectrophotometer, with the use of an oxygen-acetylene flame attachment. In later work an EEL flame photometer was used. As standards, solutions of the three cations as chlorides were used containing the salts in about the same concentration as the test specimen. Control and recovery experiments showed that potassium and sodium analyses were accurate to within 1%, lithium analyses to within 3%.

The urinary chloride content was estimated by the usual Volhard titration; the accuracy of the method is within 1%. The plasma chloride content was estimated with a potentiometric apparatus with the use of a silver chloride electrode, the accuracy being 1%.

Sulphate was estimated by precipitation with benzidine and titration with alkali.

Phosphate was estimated by the use of amino-naphthol-sulphonic acid.

Bicarbonate was estimated by the manometric Van Slyke technique.

To simplify the presentation, all doses, contents or concentrations are given in milliequivalents. The relations are as shown in Table I.

TABLE I.

Observation.	Salt.			
	LiCl.	Li <sub>2</sub> SO <sub>4</sub> ·H <sub>2</sub> O.	Li <sub>2</sub> CO <sub>3</sub> .	Li <sub>2</sub> C <sub>4</sub> H <sub>7</sub> O <sub>7</sub> ·4H <sub>2</sub> O.
Molecular weight ..	42.4	127.96	73.89	279.96
10 milliequivalents ..	0.424 gramme	0.64 gramme	0.37 gramme	0.93 gramme
1 gramme ..	23.6 milliequivalents	15.6 milliequivalents	27.0 milliequivalents	10.75 milliequivalents
10 grains (0.65 gramme)	15.4 milliequivalents	10.4 milliequivalents	17.5 milliequivalents	7.0 milliequivalents

#### RESULTS.

##### The Effect of Moderate Single Doses of Lithium.

The doses of lithium used in prolonged medical treatment range from 15 to over 50 milliequivalents per day, ingested in three fractions after meals. In experiments on ourselves and on volunteers, the full amount was taken in one dose, usually one to two hours after breakfast, together with 50 to 100 millilitres of warm water.

##### Excretion and Retention of Ingested Lithium.

**The Pattern of Lithium Excretion.**—Ingested lithium is excreted in faeces, sputum, sperm, sweat *et cetera*, but

mainly in the urine (Kent and McCance, 1932; Talso and Clarke, 1951; there seems to be no reference to the lithium content of human or animal milk). Radomski *et alii* (1950) stated that virtually all lithium not retained in the body could be demonstrated in the collected urine of their dogs. We could recover about 95% of the dose. It was therefore not considered necessary to assay the lithium content of other excretions.

The ion became detectable in the urine about fifteen minutes after ingestion. Its urinary excretion presented the following constant pattern: (i) an initial peak of six to eight hours' duration, during which period from one-third to two-thirds of the dose was excreted, followed by (ii) a very slow excretion of the remaining lithium, the ion still being detectable after a fortnight (Figures I, II, III).

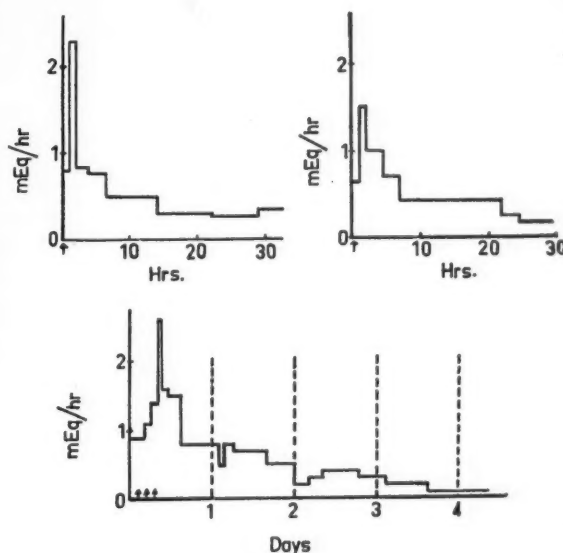


FIGURE I.

The rate of urinary excretion of lithium after ingestion of 19 milliequivalents of lithium chloride (top) and 50 milliequivalents of lithium carbonate, the latter taken within two hours in three fractions of 20, 20 and 10 milliequivalents (bottom).

The peak period was counted from the time of ingestion of lithium to that of the flattening of the urinary excretion rate. The increase and decrease of the excretion rate showed itself, in thirty-minute specimens, in steeply ascending and descending steps, the highest excretion rate being about one and a half hours after ingestion, and amounting for a short time to 20% to 30% of the dose per hour. Examination of the "peak" specimens of urine revealed neither albuminuria nor any other pathological findings. The fraction of lithium excreted during the peak period was independent of the anion, but increased with the dose from 20% to 30% after the ingestion of 15 milliequivalents to 50% to 60% after doses of 50 milliequivalents or more.

The final excretion of lithium showed a smooth and steady decline over ten to fourteen days in twenty-four-hour specimens. It decreased slightly more rapidly during the second and third day, than later, when it amounted to about 10% per day of the amount still retained. Clinical experience suggested that sodium chloride is a moderately efficient antidote to lithium poisoning, and accelerates the disappearance of the symptoms (Talbot, 1950; Noack and Trautner, 1951); but attempts to accelerate the excretion of lithium by moderate fluid intake, with and without additional sodium, potassium or ammonium salts, met with only slight success. It appeared that the urinary excretion of lithium followed a distinct pattern which is not easily influenced.



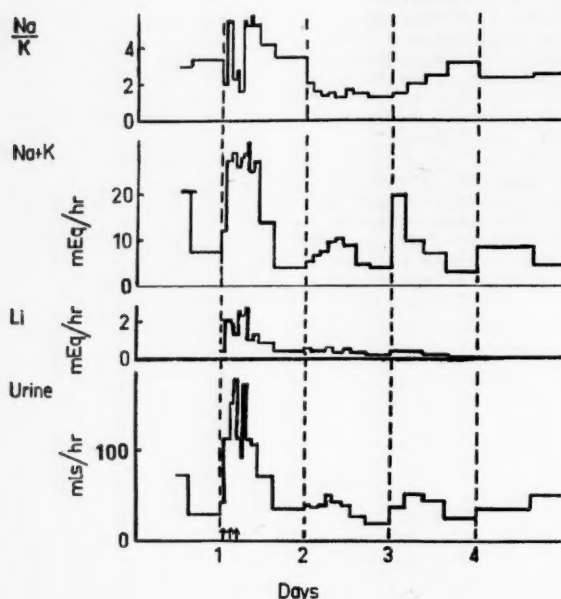


FIGURE II.

The rate of urinary flow and of excretion rate of lithium (sodium plus potassium), and the sodium to potassium ratio, after the ingestion of 50 milliequivalents of lithium carbonate taken in three doses within two hours.

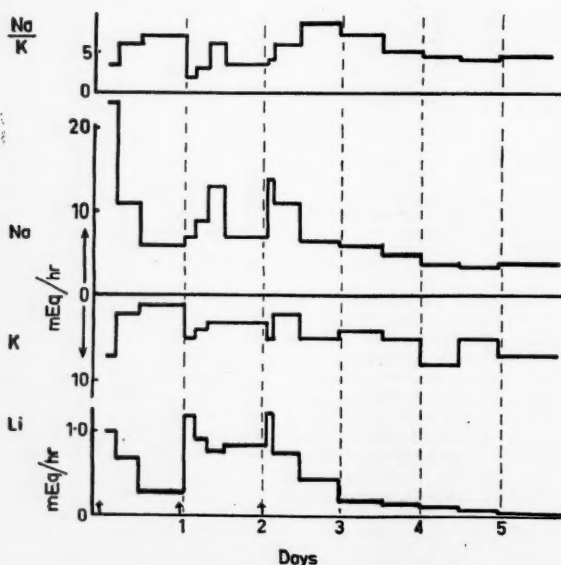


FIGURE III.

Excretion of lithium, sodium and potassium, and sodium-potassium ratio, after three daily doses of 30 milliequivalents of lithium chloride. The potassium excretion is plotted downwards from the zero line of sodium excretion; the distance between the two levels therefore presents the sodium plus potassium values.

**The Distribution of the Retained Lithium.**—The distribution of lithium in the body was investigated by plasma assays, supplemented by the determination of the amounts of lithium already excreted in the specimens of urine. Table II and Table III show the results of a typical experiment.

It is seen that, about one and a half hours after ingestion of lithium, and coincidentally with the urinary peak, there was a high lithium concentration in the plasma, the values reaching 6% to 7% of the retained lithium per litre of plasma. This value fell during the following six to eight hours to 2% to 2.5% per litre of the lithium still retained and remained at this level during the period of final lithium excretion. The amount of lithium still retained could thus, during the final period, be calculated with accuracy from a single plasma determination, on the assumption that the distributions of lithium in plasma and tissue were nearly the same. It was not possible to follow the progress of the initial changes in the extracellular and intracellular lithium concentrations, but a clinical observation was made which may have a bearing on the plasma-tissue lithium gradient, and which will therefore be inserted here.

TABLE II.<sup>1</sup>

Time.	Blood.		Plasma.			
	pH.	Hæmatocrit.	Chloride.	Sodium.	Potassium.	Lithium.
1.40	7.44	44	110	150	4.3	0.0
2.50	7.58	49	114	144	4.8	1.57
4.10	7.41	49	108	147	4.2	1.24
7.30	7.41	47	111	151	4.4	0.92

<sup>1</sup> The subject ingested 30 milliequivalents of lithium chloride with 120 millilitres of water at 1.50 p.m. on

**Lithium Nausea.**—Doses of lithium below 20 milliequivalents did not cause unpleasant sensations, but only a few of us tolerated without discomfort 30 milliequivalents, and none 50 to 60 milliequivalents. The symptoms were as follows: dysfunction of the central nervous system, vertigo, impairment of mental function and concentration (though not necessarily sleepiness); diminished cutaneous sensation and impairment of proprioception (despite objectively accurate motion, the legs "seem to drag behind and not to do what they are told"); diminished motor coordination and visual accommodation; and a feeling of muscular heaviness and weakness. Further, there were pronounced malaise and anorexia and occasional vomiting. Nausea was likely to occur whenever the single dose was high enough to cause a quick rise of the plasma lithium concentration to above 1.3 to 1.5 milliequivalents per litre. The symptoms increased in intensity throughout the time of these high plasma lithium values (one to one and a half hours), and faded so rapidly over ten to fifteen minutes that we could eat a full meal with a good appetite, only half an hour after feeling as if we would never want to eat again. The amount of lithium excreted during this fifteen-minute period was not sufficient to alter the body levels enough to account for the complete disappearance of pronounced symptoms; possibly the turning point of the nausea coincided with the onset of a distinct decrease of the plasma-tissue lithium gradient. No unpleasant sensations were experienced during the later period of lithium equilibration, or during that of its final excretion.

#### Disturbances of Water and Ionic Balance.

Shortly after the ingestion of lithium and coincidentally with the plasma lithium peak, there was a slight disturbance of plasma pH, together with an increase in plasma potassium and a more pronounced decrease in plasma sodium concentration (Table II). The bicarbonate values followed the pH values. These disturbances were within the margin of physiological variation, and were of very short duration. In contrast to the plasma, there were prolonged and significant changes in the composition of the urine, which became observable at about the time of the urinary and plasma lithium peaks and reached maximum intensity several hours later.

**Water Balance.**—The ingestion of lithium was frequently followed by a short diuretic phase, during which urine flow rates of 200 to 300 millilitres per hour were reached. After several hours or on the following day, there occasion-



ally appeared to be slight water retention. This extra excretion of water was not accompanied by a parallel increase in lithium excretion (Figures II, III, IV). This temporary diuresis did not cause any inconvenience. The observation is considered to be important in view of the occasional occurrence of symptoms resembling those of *diabetes insipidus* in clinical cases of lithium poisoning.

**Acid-Base Relation.**—One to three hours after the ingestion of lithium there began excess cation excretion in the urine which manifested itself in an increase of the urinary

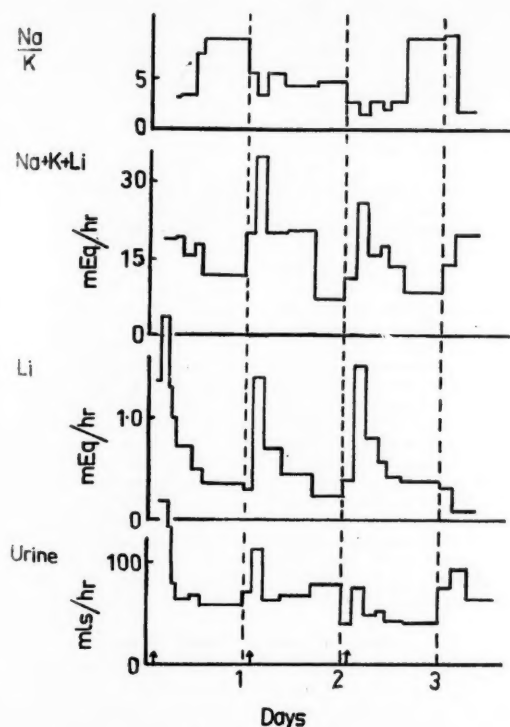


FIGURE IV.

The rate of urinary flow, of excretion of lithium and of lithium plus sodium plus potassium, and the sodium to potassium ratio, after three daily doses of 20 milliequivalents of lithium carbonate.

pH by 1.0 to 1.5 units (Figure VII). Strongly acid urine became less acid; more neutral urine reached values up to 7.5 and 7.8. This pH rise was observed whether the lithium was ingested as carbonate or as the neutral chloride or sulphate; the effect of the carbonate was found to be considerably greater than that of an equimolar quantity of sodium carbonate.

When the individual ions were assayed, it was found that initially all inorganic ions were excreted in excess over the previously ascertained average, but the disturbance of the acid-base balance was mainly due to excess sodium excretion. While potassium was excreted during a period of four to six hours after the urinary peak excretion of lithium to an amount about equal to the amount of lithium ingested, extra sodium was excreted for eight to eighteen hours to an amount exceeding five to 15 times the equivalent of the lithium ingested. This independent movement of the two cations was shown well in the sodium-potassium ratios, which were low at first but increased later (Figures I, III, IV), the turning point being at about the time of the final plasma-tissue lithium equilibration. Excess chloride excretion was observed even when lithium was ingested as the carbonate, citrate or sulphate; it persisted throughout the period of excess sodium excretion (Figure

V), though its extent was always lower than that of cation excretion, amounting to about three to five times the equivalent of the lithium ingested. Excess bicarbonate was excreted whenever the pH of the urine rose above 7.0 (Table III); this effect did not seem to influence the excretion of the other ions. Calcium, magnesium, phosphate and sulphate were alike excreted in slight excess during the time of ionic disturbance, but the amounts were too small to be considered significant within the range of the present investigation.

Frequently there was indication of sodium retention on the second or third day after lithium ingestion; a compensatory retention of chloride was occasionally suggested, but it could not be demonstrated for potassium or any of the other ions. An indication that the ionic disturbances lasted longer than could be shown by urinary assays was given by the constant observation that experiments conducted after one to two lithium-free weeks gave much clearer results than did experiments conducted while lithium from previous experiments was still in the body. Possibly the actual disturbance is not confined to the inorganic ions assayed.

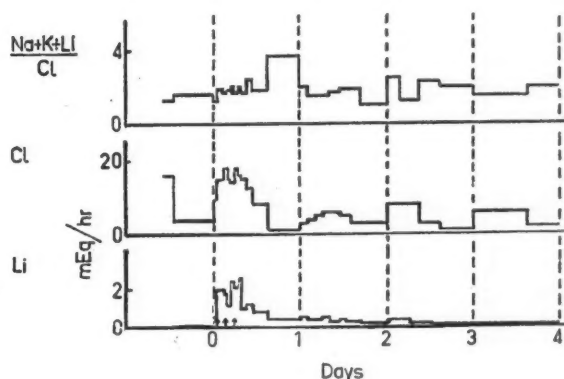


FIGURE V.

The rate of excretion of lithium and of chloride, and the sodium plus potassium plus lithium to chloride ratio after ingestion of 50 milliequivalents of lithium carbonate taken in three doses within two hours.

#### The Effect of Repeated and Prolonged Ingestion of Moderate Doses of Lithium.

##### Constancy of Effects.

The investigation of the effects of individual doses of lithium ingested at intervals of one day or less showed the following two characteristic features: (i) The excretion of lithium assayed in twenty-four-hour urine specimens increased until it equalled within a few days the amount ingested. (ii) The water and ionic disturbances decreased until finally, again in twenty-four-hour urine specimens, no significant disturbances could be detected.

**Lithium Excretion and Retention.**—When a high dose of lithium was taken in fractions at intervals of thirty to sixty minutes, the effect was merely to spread the urinary peak period for an hour or two, without further changing the course of lithium excretion (Figures I, II, V). When the second dose was taken after the urinary peak of the previous one had passed, a new urinary peak superimposed itself over the excretion rate already existing (Figures III, IV); but the peaks became progressively wider, longer in duration and less defined. On regular prolonged ingestion, the daily excretion of lithium increased steeply for five or six days, when equilibrium between ingestion and excretion was reached (Figure VI); when lithium intake was stopped, the excretion of the amount retained, about one and a half times the daily dose in the experiment recorded, decreased rapidly for two or three days, and then very slowly for a fortnight or longer, on the pattern

TABLE III.  
Results in Urine.

Secretions in Urine.											
Urine.			Salt.								pH.
			Sodium.		Potassium.		Lithium.		Chloride.		
Time.	Volume.	Millilitres per Minute.	Milli-equivalents per Litre.	Micro-equivalents per Minute.	Milli-equivalents per Litre.	Micro-equivalents per Minute.	Milli-equivalents per Litre.	Micro-equivalents per Minute.	Milli-equivalents per Litre.	Micro-equivalents per Minute.	
2.00	32	0.535	180	96	33	17.7	1.2	0.64	163	87	5.28
2.25	19	0.475	207	97	33	15.7	22.4	10.6	182	86	6.30
3.20	58	1.03	208	214	89	91.0	27.0	27.7	—	—	7.20
4.35	59	0.794	254	201	114	91.0	34.6	27.5	255	202	7.18
5.15	22	0.44	—	—	—	—	—	—	—	—	—
6.30	32	0.713	301	215	76	54.0	24.3	17.3	283	202	6.80
7.30	75	0.835	224	176	52	43.4	20.2	16.8	207	172	—
8.10	31	0.777	194	150	34	26.4	19.6	15.3	200	155	6.84
8.45	17	0.585	234	113	36	17.4	23.7	11.5	265	128	6.55

seen with single doses. This pattern of lithium excretion and retention was found to be constant; the fraction of lithium retained was proportionally less with higher doses, but there was no limiting "lithium space". The retention level depended on the dose; lower lithium doses, even on very prolonged ingestion, would not cause the same amount of retention as higher doses. The retention ranged from one and a half times to twice the daily doses, decreasing with the increase of the dose, and varying only slightly with the subject.

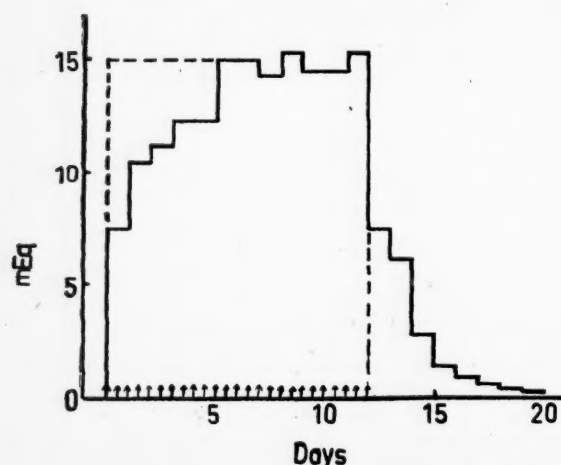


FIGURE VI.

The rate of urinary excretion of lithium, measured in 24-hour specimens, during the daily ingestion of 15 milliequivalents of lithium carbonate for twelve days.

After each new ingestion there was a new peak in the plasma lithium concentrations over the existing lithium level. The height of these peaks was about the same as that recorded for single doses. Repeated ingestion thus caused a series of plasma peaks; with high single doses these fluctuations could equal or exceed the basic level, resulting in very strong, though short-lived, changes in the plasma-tissue lithium gradient. Examination of the morning specimens of plasma, however, taken twelve to fifteen hours after the last ingestion and before the new one, showed a slow, steady increase during the first days of lithium accumulation, a constant level during the stable state of lithium equilibrium, and slow decrease when ingestion was stopped. The values corresponded closely to the amount of lithium retained on the assumption of near-equal plasma-tissue distribution—about 3% of the daily dose per litre with low doses, and 2% or less with higher doses.

**Ionic Disturbances.**—It was as yet not possible to conduct controlled experiments. The urinary pH values (Figure VII) showed that some ionic disturbances persist, although they become shorter and less pronounced. The results of single urinary assays tended to be erratic even after a few doses of lithium, one or other of the effects described for single doses of lithium being no longer demonstrable. Excess sodium excretion was the most constant effect. However, after a few days of ingestion of lithium, the assay of twenty-four-hour specimens of urine no longer revealed any abnormalities. It appeared that, at least with moderate doses of lithium and regular food intake, an equilibrium between ionic intake and excretion was soon reached, and that such disturbances as might have been caused by the individual doses of lithium were satisfactorily compensated during the day. After cessation of ingestion of lithium there was a tendency to more acid urine (Figure VII) and possibly some sodium retention, but it seemed that whatever compensations might have occurred were very slow; there was never any pronounced effect from the sudden withdrawal of prolonged ingestion of lithium, either on the water or the ionic balance of the subject.

#### Criteria of the Stable State.

In view of the clinical importance of the early detection of a possibly latent but progressive ionic loss, or of other damage to the patient under prolonged lithium medication, the criteria of a stable and safe condition were specially investigated. The results presented refer to several hundred patients whose persistent psychotic condition was, for months or years, controlled by a constant daily dose of lithium. The actual dose varied greatly, ranging from 15 to over 50 milliequivalents, the maniacal patient generally tolerating higher doses of lithium than the healthy (Noack and Trautner, 1951). It may be noted that even on prolonged medication the therapeutic effect of the drug was maintained. There was never any indication of adaptation.

The observations which are considered to characterize the stable state are as follows.

**Lithium Equilibrium.**—Lithium equilibrium was established in six to ten days after the start of treatment. The lithium content of twenty-four-hour specimens of urine varied from 90% to 105% of the dose. Any greater discrepancy indicated either that the patient did not take the drug according to the instructions or that there was abnormal lithium retention. (These points are dealt with in a later section.)

**Constant Basic Plasma Lithium Level.**—The range of morning plasma lithium levels, about fourteen hours after the last ingestion (including doses above 50 milliequivalents per day) was as shown in Table IV. The constancy and correct level of the plasma lithium after about six to ten days of ingestion were found to be of the utmost importance. Whenever careless ingestion could be excluded, any abnormal value was taken as an indication to stop the ingestion of lithium, to assay in the collected urine

the amount of lithium actually retained, and to ascertain the pattern of lithium excretion.

**Normal Plasma Composition.**—No abnormalities of sodium, potassium or chloride levels were observed, even under prolonged medication, provided that lithium equilibrium and level (as outlined in previous paragraphs) were maintained, and of course provided that the patient had adequate food intake. Occasionally there seemed to be a tendency to low sodium levels, but many patients showed normal sodium levels throughout the whole period of medication.

**Stable Health.**—The patients were examined at regular intervals. Most of them had no complaints, and no undue disturbances were observed by their relations or friends. Their domestic and professional efficiency was satisfactory, and their social relations were normal. Clinical examina-

modify or supplement the observations obtained with moderate doses. No clinical discussion is intended.

#### Observations During the Treatment of Acute Mania.

The clinical procedure is to attempt to break the mania within a few days by the use of large doses of lithium. It appeared that the range of moderate doses had to be exceeded to break the mania, the usual doses being three or four times higher than those tolerated by the healthy, and varying from 55 to 80, or even more, milliequivalents per day. Lower doses, even with prolonged medication, had no effect. However, these high doses were as a rule no longer tolerated once the mania abated, and the amount of lithium ingested had to be reduced or its administration temporarily stopped to avoid toxic complications. Therefore, the observations were restricted to a period of six to ten days, and confined to the initial reaction of the patient to the high dosage. The patients were usually not cooperative, and the interpretation of the results was further confused by the accompanying clinical change and by the interrupted medication. Nevertheless, it was possible to ascertain some of the features of this "lithium shock" treatment of the acutely maniacal.

TABLE IV.

Intake. (Milli- equivalents.)	Plasma Lithium per Litre. (Milliequivalents.)	Percentage of Daily Dose per Litre.
17	Less than 0.5	About 3.0
35	0.8 to 1.0	2.5 to 3.0
53	1.2 to 1.5	2.3 to 2.8
83	1.5 to 2.0	1.9 to 2.3

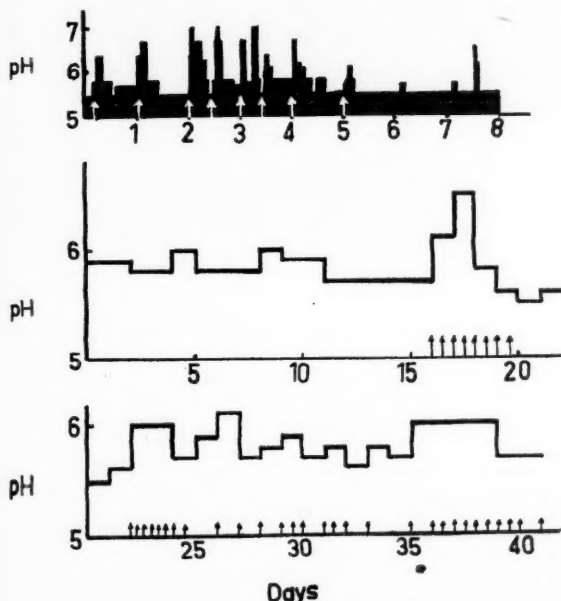


FIGURE VII.

The urinary pH during prolonged treatment with lithium chloride. Top: pH of single specimens of urine after ingestion of 17.5 milliequivalents (at arrows); bottom: calculated average daily pH after ingestion of 17.5 milliequivalents (long arrows) and 12.5 milliequivalents (short arrows) per dose.

tion showed that the functioning of heart and muscle and digestive apparatus was normal, and in particular, that despite occasional mild and transient albuminuria there was no sign of actual kidney damage. The reproductive organs appeared to be of normal function, though many patients showed a lowering of libido as compared with their hyperexcitability while maniacal. A few patients showed slightly increased diuresis, and some were possibly mildly sedated with the doses required to maintain the clinical improvement.

#### Observations with Potentially Toxic Doses and Toxic Manifestations.

In view of the seriousness of the symptoms experienced by Cleaveland (1913) after prolonged ingestion of large doses of lithium (two grammes of the chloride)—symptoms which were verified in our own attempts—it will be understood that we could not undertake experiments with potentially toxic doses on ourselves or on patients. However, in clinical practice the use of doses far exceeding those tolerated by the healthy is often warranted. In the present context the findings will be recorded only in so far as they

**Lithium Excretion and Retention.**—Two factors emerged: (i) the initial daily lithium excretion was far below the 50% to 70% of the dose expected from the findings on the healthy; (ii) the excretion did not increase on the same steep pattern. Table V presents the urinary assays of two patients started on 78 milliequivalents (nine five-grain tablets) of lithium carbonate per day. The initial low excretion is well seen. In another case, that of an old woman receiving 64 milliequivalents per day, almost no lithium could be detected in the scattered specimens obtained during the first four days, and her condition was considered to be alarming when suddenly, accompanied by a break of the mania, massive lithium excretion set in. It appeared generally that the lithium retention and tolerance during the maniacal attack were higher than in the healthy, and dropped as soon as the mania abated. However, the patient in Case I (Table V) showed progressively increasing lithium excretion and seemed to approach a stable state. On the sixth day, with an improvement of the mental condition, lithium treatment was stopped, to be recommenced on the eighth day on a lower dosage of 52 milliequivalents per day. The continued high lithium excretion is clearly shown; from the eighth to the tenth day it exceeded the intake. The patient in Case II did not show, within thirteen days, any signs of a satisfactory approach to lithium equilibrium; therefore the medication was stopped to avoid dangerous accumulation of lithium. It is likely that on prolonged high doses lithium equilibrium and a stable state are not always safely attained. No relation between the pattern of the initial lithium excretion and the resulting therapeutic effect could as yet be observed. The morning plasma lithium levels rose sharply during the first few days of high lithium ingestion to values of two to three milliequivalents per litre, but on the assumption of near-equal plasma-tissue distribution they corresponded satisfactorily to the amounts retained. When lithium intake was stopped they fell slowly, in the same proportions as the amounts excreted.

**Ionic Equilibrium.**—The urinary assays of the patient in Case II (Table V) show increased sodium excretion during the first days of high dosage of lithium ingestion. In other cases this initial sodium loss was less evident, but so far it has been impossible to control the food intake



TABLE V.  
Two Cases of Acute Mania: Urinary Findings with a Daily Dose of 78 Milliequivalents of Lithium Carbonate.

Day.	Volume. (Millilitres.)	Sodium.		Potassium.		Lithium.		Amount of Lithium Ingested. (Milliequivalents.)
		Milliequivalents per Litre.	Total.	Milliequivalents per Litre.	Total.	Milliequivalents per Litre.	Total.	
Case I.								
1	2100	90.3	192	24.6	52.0	5.0	10.2	78
2	2100	85.2	180	24.6	52.0	10.0	21.0	78
3	1710	109.7	188	34.6	58.0	18.0	32.0	78
4	1920	85.2	174	32.7	63.0	13.0	25.0	78
5	1620	97.4	158	28.6	47.0	11.5	18.5	78
6	1950	97.4	190	32.7	64.0	23.8	46.5	None
7	1850	—	—	—	—	—	(lost)	None
8	1860	97.4	181	46.1	86.0	37.6	70.0	52
9	1920	85.2	188	34.6	56.0	43.4	70.0	52
10	1940	111.7	235	30.7	59.0	47.5	92.0	None
11	1500	85.2	128	18.4	27.5	12.2	18.3	52
12	?	85.3	—	20.4	—	12.9	—	52
Case II. <sup>1</sup>								
1	2100	109.2	230	36.8	75.0	7.0	14.6	78
2	1440	121.7	175	57.1	84.0	16.0	23.0	78
3	840	158.3	133	49.1	41.0	32.0	27.0	78
4	1860	133.9	247	34.6	63.0	21.0	39.0	78
5	3300	97.4	325	20.4	62.0	11.8	39.0	78
6	2100	109.7	232	28.6	61.0	22.4	47.0	78
7	1660	109.7	182	20.4	33.7	26.7	44.5	None
8	1600	121.7	195	43.0	70.5	26.7	43.0	78
9	2010	70.0	147	24.6	53.5	30.3	68.0	None
10	1240	97.4	130	36.8	49.0	31.7	43.0	78
11	2190	85.2	187	28.6	63.0	19.4	42.5	None
12	1250	97.4	122	34.6	43.0	23.0	28.5	78
13	1800	109.7	198	43.6	78.0	26.7	48.0	78

<sup>1</sup> A heat-wave occurred from the second to the fourth day; this accounts for the erratic amounts of urine excreted.

of these patients, or to assess their ionic status at the start of the treatment. No significant changes were observed in the composition of the plasma, and in no patient as yet treated was there a clinical condition which would justify the suspicion of hyponatraemia.

#### Observations During Prolonged High Dosage of Lithium.

In many cases the initial improvement could be maintained only by keeping the patient on doses of lithium exceeding 50 milliequivalents per day. This dosage involves a risk of toxic complications, either developing slowly or appearing abruptly, and the patients were preferably kept under hospital observation until the therapeutic dose could be lowered to a safer level. The following observations refer to such patients during weeks or months in which a persistent tendency to mania, as shown by a relapse within a few days whenever the administration of lithium was stopped, was successfully controlled by continued high dosage of lithium.

**Relation of Initial and Later Doses.**—There was no traceable relation between the dose of lithium required to break an acute mania and that required to maintain the therapeutic effect. In some cases the maintenance dose was only slightly less than the initial dose, in others it could be considerably reduced, though it was rarely that a patient who had needed a high initial dose could be maintained on less than 25 milliequivalents per day. The clinical aim was, of course, to establish the minimum dose capable of controlling the mania, and it seemed that, at least with some patients, there was a definite therapeutic level. For example, one married woman, aged twenty-nine years, was rather subdued and pleasantly cooperative as long as her plasma level was kept at about 0.8 milliequivalent per litre with a dose of 47 milliequivalents per day; she became grossly irresponsible and unmanageable if the level was allowed to drop below 0.6 milliequivalents per litre. The observation was made on repeated attempts to lower her lithium intake with a view to releasing her from hospital. In patients receiving lower maintenance doses, slightly irregular medication did not affect the mental condition to the same extent.

In acute mania, the toxic and the therapeutic doses seemed often to be very near to each other, and toxic symptoms were likely to appear even before the mania broke. So far it has been found that maintenance patients tolerated the minimum therapeutically effective dose perfectly well; they did not develop toxic symptoms if the dose was increased by 10% to 20%, but they did not tolerate an increase of 50%. There was thus, as far as the actual dosage is concerned, a fairly safe margin between the therapeutic and the toxic doses; but often the tolerance fell as the mental condition became more stable, and the maintenance dose could be, or had to be, lowered after weeks or months of a relatively high dose.

TABLE VI.

Day.	Volume of Urine.	Total Sodium Content.	Potassium.	Lithium. (Milli- equivalents.)
2	1320	76.0	26.4	35.0
3	2220	105.5	35.5	28.6
4	1710	98.5	39.4	15.5
5	1560	112.5	75.0	10.7
6	1680	159.5	74.0	10.5

**The Clinical Picture of the Stable State on Prolonged High Dosage of Lithium.**—Periodically repeated examinations showed excretion of lithium equal to intake, lithium retention amounting to one or one and a half daily doses, and plasma lithium levels corresponding to the retention, on the assumption of near-equal plasma-tissue distribution. Repeated examination of the same patient revealed irregular fluctuations within a range of 10% of the postulated value. The plasma sodium and potassium concentrations showed a like tendency to slightly erratic values; sodium concentrations below 140 milliequivalents per litre and potassium concentrations above five milliequivalents per litre were occasionally observed to alternate with normal values within a few days in the same patient. It appeared that the ionic balance in patients receiving high doses of lithium was slightly less stable than that found with moderate doses. No actual depletion of any



ion was ever observed, and no additional sodium or other medication seemed to be required. (However, lithium medication was always interrupted at the first signs of toxic symptoms, or when too high plasma lithium values were found. Possibly the rise in the plasma lithium level precedes the excess excretion of sodium and other ions observed in experimental animals.)

No observations were made which indicated a progressive impairment of the general health of the patient. Such minor disturbances as were found—distinct sedation, slightly increased thirst, temporary auburnuria, a mild tendency to diarrhoea *et cetera*—were neither more frequent nor more pronounced than in patients receiving a moderate dosage. No heart or circulatory troubles were met. It was noted that blood specimens from patients receiving lithium in high dosage showed, on standing, a greater tendency to hemolysis than specimens taken under the same conditions from untreated patients. However, no actual damage *in vivo* could be demonstrated.

**Factors Affecting the Stability of the Condition.**—Many patients tolerated months of high lithium medication without ever giving cause for concern; others were distinctly labile. The factors mainly affecting the stability of the conditions were the following:

**Changes in the Mental Condition.**—Aggravation of the tendency to mania frequently required an increase of the dose of lithium, but it did not cause toxic symptoms; however, any abatement in the tendency to mania led to the appearance of toxic symptoms either directly or in combination with the factors listed below.

**Intercurrent Diseases.**—Any intercurrent illness, even a slight cold, could cause the onset of toxic symptoms. Therefore the intake of lithium was stopped at the first symptoms of an intercurrent disease, and also, patients in whom mild toxic symptoms suddenly appeared were examined for a developing illness.

**Stress.**—The strain of a heatwave of two or three days' duration frequently caused toxic symptoms in patients receiving high lithium medication, while patients receiving lower doses or untreated patients showed no more discomfort than the healthy. Since the symptoms were not always typical, lithium medication was interrupted whenever a patient showed excessive sweating, became confused, or seemed in other ways to suffer excessively from the heat. The question of whether strenuous physical exercise alone could precipitate toxic symptoms cannot be answered, as no such case came under observation; normal ward or gardening activities and moderate sport did not affect the well-being of the patients.

#### Observations Related to Toxic Manifestations.

**Toxic and Dangerous Lithium Levels.**—No toxic symptoms were ever encountered with maintenance doses below 15 milliequivalents per day; but in a few cases only slightly higher doses caused sufficiently strong gastric discomfort to require interruption or modification of the medication. On the other hand, four or five times this dosage was well tolerated by many patients for a prolonged time. In a few cases toxic symptoms appeared one or two days after treatment had been stopped. The incidence of toxic symptoms was thus not closely related to the dosage, nor did it by itself indicate a dangerous condition. The relation between dose, retention and plasma levels of lithium is considered to be more important than any of these factors alone, and we exercised caution in any case in which the plasma lithium level exceeded by 50% that shown by other patients receiving the same dose. In our experience there was no cause for serious concern if toxic symptoms appeared on an intake of less than 35 milliequivalents per day, with plasma levels below 1.5 milliequivalents per litre; but prolonged plasma levels above 2.5 or 3.0 milliequivalents per litre were regarded as potentially dangerous, even in the absence of toxic symptoms, particularly if lithium levels were in excess of the dose and showed a tendency to increase on a constant administration.

Only a few observations bearing on the question of lethal lithium levels could be collected. In two cases, in which apparently 105 milliequivalents per day were ingested, grave intoxication occurred on the fifth day; both patients had plasma levels slightly above four milliequivalents per litre; one survived. In another fatal case, in which lithium poisoning was mistaken for heat collapse, the plasma levels, in milliequivalents per litre, when the patient was first examined were as follows: lithium 4.9, sodium 123, potassium 5.2. It would seem that the lethal level lies between four and five milliequivalents per litre. In the treatment of toxic complications, we found that patients with plasma lithium levels of 3.0 to 3.5 milliequivalents per litre recovered within a few days with the withdrawal of lithium alone, or with additional symptomatic treatment, while the few patients who were examined with plasma levels above 4.5 milliequivalents per litre died despite all therapeutic efforts. Possibly an irreversible condition is caused by a prolonged excessive plasma level of lithium.

**Lithium Poisoning.**—No case of acute lithium poisoning was observed by ourselves, and no detailed case history appears to be recorded in the literature. In one case of death from lithium therapy, the duration of excessive administration of lithium was alleged to have been only three or four days, the patient becoming progressively drowsy, stuporose and comatose; apparently there was no pronounced nausea or vomiting. The actual dose could not be established. When first examined, the patient was moribund, with grave circulatory collapse; the plasma lithium level twelve hours before death was slightly over five milliequivalents per litre. The post-mortem examination revealed no specific findings other than generalized extreme softness and flabbiness of all organs; the lithium content of heart, liver, brain, kidney and skeletal muscle was of the order of five milliequivalents per kilogram, the variations not being significant enough to suggest differences in the content of the organs. In another case the findings were identical.

It must be noted that the appearance of mild toxic symptoms with prolonged lithium therapy does not necessarily indicate the onset of lithium poisoning; often these symptoms can be relieved by subdivision of the dose, by alteration in the mode of its ingestion, or by additional sodium medication (Giesinger, 1951). In the present context the term "lithium poisoning" is used for a condition which, unless lithium ingestion is stopped, develops progressively to dangerous dimensions, and may possibly end fatally. The early symptoms were the same as those of the temporary nausea after too large a single dose, but they were persistent throughout the day and increased steadily. Usually only one of the symptom groups was prominent: nausea with vomiting or diarrhoea; or staggering gait with confusion and mental retardation; or muscular fasciculation, especially of the muscles of the hand, forearm, face or tongue. Incontinence of urine and faeces and unconsciousness are not early signs of lithium poisoning, though they may develop later. No early impairment of heart or kidney function was ever observed; but if the administration of lithium is not stopped, circulatory collapse develops rapidly. There were never any itching or cutaneous eruptions. High fever and headache are symptoms of an intercurrent disease rather than of lithium poisoning.

**Lithium Collapse.**—The term "lithium collapse" is proposed for a rare complication which presented an entirely different clinical picture. After weeks or months of well tolerated high lithium dosage the patients became, without noticeable prodromal symptoms, confused, incontinent of urine and faeces and stuporose, and sank within a few hours into a deep progressive coma with grave dehydration and circulatory collapse. The condition showed the picture of an acute crisis, involving the regulatory mechanisms of the central nervous system and its endocrine connexions; varying from case to case, there were temporary glucosuria, extreme polyuria of a *diabetes insipidus* type, muscle clonus with almost epileptiform convulsions, and related disturbances. This collapse differed from the usual lithium poisoning, in that most patients developing lithium poison-

ing complained about their symptoms, and were as rational as their psychotic state permitted, while those with impending collapse became confused beyond awareness before the bodily symptoms appeared; they were not in the least perturbed by the sudden onset of incontinence of urine and faeces. After recovery, they usually had amnesia for the period of the collapse and some time preceding it.

It may be added that after their recovery the patients were usually in good, and often in improved, mental condition. Neither the response to, nor the tolerance of, lithium appeared to be affected when, after weeks or months, the patients again became maniacal and lithium therapy was resumed.

#### Anomalies in Lithium Excretion and Retention.

In a few cases irregularities of lithium retention or excretion were observed which could not be connected with changes in the mental condition of the patient, or with intercurrent illness, or with extraneous factors; these irregularities appeared to be inherent anomalies in the response of the patient to the introduction of the foreign ion. It is intended to study several of these patients for a prolonged period; in the present context only the observations will be presented.

#### Lithium Accumulators.

In over 300 cases investigated, a total of six cases was found in which the patient, instead of reaching lithium equilibrium and a constant plasma lithium value within the range of that shown by other patients on the same dosage, rapidly and progressively accumulated lithium to dangerously high plasma levels. All these patients were suffering from chronic mania and had been in hospital for a long time. The condition appeared to be more frequent in women than in men, five of the six patients being women.

**CASE I.**—Mrs. P., a middle-aged woman, weighing about 55 kilograms, was for years in a condition of persistent mania, abusive, unmanageable, and violent. She was started on 64 milliequivalents of lithium citrate per day. Since there was no improvement, the dose was increased to 84 milliequivalents per day. Examination of a specimen of blood taken five days later showed a plasma lithium content of 3.4 milliequivalents per litre, instead of the expected 1.7 milliequivalents per litre. There were neither toxic symptoms nor clinical benefit. Lithium therapy was stopped, and it was intended to collect a twenty-four-hour specimen of urine, but the patient was non-cooperative to the extent of wetting her clothes. Two days later examination of a blood specimen taken from the patient under strong protest showed 2.7 milliequivalents of lithium per litre. The patient then showed slight symptoms of poisoning—that is, slightly staggering gait. After five more days the plasma lithium level had dropped to 0.7 milliequivalents per litre and the patient was no longer in a toxic state but still maniacal. Apart from the withdrawal of lithium, no other treatment was given.

**CASE II.**—Mrs. W., aged forty-three years, suffering from persistent mania, received 64 milliequivalents of lithium per day for one week without any effect on her mental condition. The dose was raised to 84 milliequivalents per day, and three days later her plasma was assayed and found to contain the expected 1.7 milliequivalents per litre. After a further week the plasma lithium level had increased to 2.8 milliequivalents per litre. Although there were neither toxic symptoms nor mental improvement, lithium treatment was stopped, and the urine was collected from twenty-four hours after the last dose. The lithium contents were as shown in Table VI. A total of 101.1 milliequivalents of lithium was thus collected during five days. When the facts that the collection of urine was started only on the second day after the interruption of treatment, and that some 5% can be assumed to have been excreted in faeces and sweat, are taken into account, and in view of the very slow rate of urinary lithium excretion, indicating that at least 25 to 30 milliequivalents were still present in the body when the collection of urine was stopped, it follows that the patient must have accumulated over 150 milliequivalents in her body. On a plasma level of 2.8 milliequivalents on the last day of lithium treatment, the calculation of the lithium distribution would thus suggest a slightly higher level in tissue than in plasma.

**CASE III.**—Mr. R., aged forty-seven years, was suffering from persistent maniacal agitation. Treatment with 45 milli-

equivalents of lithium per day was begun. After one week his plasma level was 0.8 milliequivalents per litre, as expected. One week later it had increased to 1.4 milliequivalents per litre, and after a further week to 1.8 milliequivalents per litre. Lithium intake was stopped, and all the urine was collected for five days. The amount of lithium excreted within that time was less than expected, which suggested an abnormally slow excretion pattern. (It may be mentioned that this patient received, in addition to lithium citrate, eight 0.5 gramme tablets of sodium succinate per day, 30 milliequivalents of sodium. It did not appear that the additional sodium prevented accumulation of lithium.)

Three more cases of lithium accumulation were observed. In one there was, at the time when lithium treatment was stopped, very slight nausea and in another staggering gait, but none showed any serious signs of lithium poisoning, and in none was any additional treatment required. The slow final lithium excretion appeared to occur in all cases; the patients accumulated lithium progressively and excreted it very slowly. In none of these six cases was any noticeable mental improvement observed; but lithium treatment was always stopped when the plasma levels substantially exceeded the expected values, and we have so far hesitated to continue the treatment.

#### Increased Lithium Excretion.

Only one case of increased lithium excretion was observed.

Mr. P., aged thirty-four years, had been in hospital for years with catatonic excitement. Treatment was started with 55 milliequivalents per day, and since there was no response the daily dose was increased over a period of weeks to 103 milliequivalents per day. Slight relief of the mania followed, but there were no toxic symptoms. The plasma lithium level was constantly about 0.8 milliequivalent per litre instead of the expected 2.0 milliequivalents per litre, but the daily urinary excretion was equal to the ingestion. No discomfort appeared to be caused by the daily passage of these large amounts of lithium through the body, or by the abrupt changes of the plasma-tissue lithium gradients. When lithium treatment was stopped, examination of the collected urine suggested lithium retention corresponding to the plasma level, and very slow excretion. When the same high dose was again given, the plasma levels did not rise above 1.0 milliequivalent per litre. After some weeks the patient developed polyuria, passing five to six litres of urine per day; this condition reacted to pitressin, but not to water withdrawal. When lithium treatment was stopped this polyuria slowly subsided during four or five weeks. No accompanying or persistent damage could be detected, but the patient reverted slowly to his previous maniacal condition.

#### DISCUSSION.

The effects of moderate doses of lithium, as presented in this paper, were obtained by observations on healthy subjects as well as on patients. However, the effects of high doses were observed only with patients under conditions in which clinical considerations indicated that these high, potentially toxic doses were warranted. In most cases the patients receiving high doses reacted according to a pattern which could be expected from the observations made with lower doses. It is thus considered justifiable to proceed on the assumption that, basically, lithium acts in the same way on patients as on normal subjects.

The present investigation was mainly concerned with the electrolyte concentrations in urine and plasma. Ingested lithium was, within fifteen minutes, demonstrable in the plasma and urine. According to Leusen and Demeester (1950), it is after two hours detectable in the cerebro-spinal fluid. Our observations indicated plasma-tissue lithium equilibrium within six to eight hours. Two outstanding results were noted as the effect of single doses of lithium: (i) a very slow final excretion of lithium after a short initial peak, and (ii) an ionic disturbance exceeding in magnitude the amount of lithium ingested.

During the period of its slow excretion about 10% of the lithium retained in the body was found to be excreted per day. A simple calculation shows that the reabsorption of lithium must almost equal that of sodium. With increase in plasma lithium levels the reabsorption rate

decreased considerably, with the result that when the patient was on a constant moderate dose, with slowly increasing plasma levels, the daily excretion finally equalled the daily ingestion. The actual ratio varied with the clinical condition, retention being higher during the maniacal phase and dropping when the mania abated. Furthermore, there were individual variations; six out of several hundred patients accumulated, or excreted, lithium in considerable excess over the amounts observed in other patients on the same doses. The distant tubules suggest themselves as the probable site of reabsorption of lithium, but further investigations will be required to determine the mechanism and its connexion with the clinical condition, and particularly whether anomalies of lithium excretion are confined to lithium only or indicate general anomalies of ionic balance.

According to Foulks (1952), lithium is taken up by the tissue against a concentration gradient. Our observations indicated nearly equal plasma-tissue distributions of the ion, and thus confirmed the observations of Davenport (1950) on the rat, and of Radomski *et alii* (1950) on the dog. Only in a few patients on high doses was there a suggestion of higher levels of lithium in tissue than in plasma.

Subsequent to the entry of lithium into the tissues, ionic disturbances were observed. The potassium plasma level and its urinary excretion increased within the range which could be expected, if it is accepted that intracellular lithium displaced potassium. Excess sodium, however, was excreted in more alkaline urine to an extent grossly exceeding mere displacement, amounting to five to fifteen times the equivalent of the lithium ingested. This excess sodium excretion lasted far beyond the time when complete lithium plasma-tissue equilibrium could be assumed. No direct observations as to the mechanism or site of this ionic disturbance were recorded; more than likely, the acid-base changes are more complex than would appear from the assays of inorganic ions alone. An indirect indication as to the implication of glandular and connected mineralotrophic systems is seen in the rare occurrence during high dosage of lithium of a *diabetes insipidus* syndrome reacting to pitressin.

This initial strain on mineral balance appeared to be readily compensated, on prolonged ingestion of moderate doses of lithium, as long as the plasma level remained below 0.7 milliequivalent per litre. However, with higher lithium doses and basic plasma levels above 1.2 milliequivalents per litre (i) the plasma sodium levels tended to be low, (ii) sodium withdrawal increased the incidence of toxic symptoms (Talbot, 1950), and (iii) sodium medication protected the patient (Glesinger, 1954). The patients were found to be less resistant to illness or stress, and the clinical observation suggested a potentially unstable condition. Radomski *et alii* (1950) found that dogs receiving large doses of lithium showed, during the last week of survival, a sudden drop in lithium excretion to below intake, together with sudden excessively high sodium losses and increased plasma potassium levels. We observed no significant ionic disturbance or depletion in our patients; however, their occurrence may be indicated by the occasional observations of the electrocardiographic changes described by Hanlon (1949), by Radomski (1950) and others. In some instances, just before lithium treatment was stopped, there was some indication of an unexpected rise of plasma lithium levels with too low plasma sodium and potassium levels. We are inclined to think that these patients may have been just at the point where they began to develop the grave ionic disturbances shown by Radomski's dogs. One of Schou's patients, who died from infarction in the pons, had a serum lithium level of 4.5 milliequivalents per litre on a daily dose of 50 milliequivalents. Schou thinks that "the high serum lithium level may have been caused by a sudden impairment of the patient's general biological functions". The question arises whether the lithium ion exercises any specific effects of its own apart from ionic disturbances and sodium losses.

Before the possibly toxic action of lithium is discussed, a curious discrepancy has to be mentioned. Toxic symptoms were observed at basic plasma levels below 0.6 milli-

equivalent per litre, levels at which there was never any indication of ionic instability; and on the other hand, at distinctly dangerous levels over 3.0 milliequivalents per litre, amounting to the displacement of about 1.5% of the total monovalent inorganic ion content of the body, there were often no toxic symptoms. Obviously the early appearance and the intensity of toxic symptoms are individual reactions of the patient rather than measures of the toxic effect.

Overton (1902) observed that lithium can, to an extent, replace sodium in its function of maintaining impulse conduction and contractability of muscle. However, Gallego and Lorente de Nó (1951) state that in frog nerve lithium can replace sodium only in restoring impulse conduction, but counteracts it in "the creation of the L fraction and in the establishment of nerve reaction". Herbst (1892) found that coelenterate embryos in lithium-containing media formed excess endoderm at the expense of ectoderm, and von Ubisch (1929) reported that segregated ectoderm under the same conditions formed ectoderm and endoderm. Macleod (1948) found that lithium depresses the motility and the metabolism of human spermatozoa; the question whether the presence of high lithium concentrations interferes with spermatogenesis or with the development of a fetus may be worth a detailed investigation. Ponder (1949) noted the greater fragility of red cells in lithium-containing media, an observation which seems to confirm our own observation of a greater tendency to haemolysis in blood specimens taken from patients receiving large doses of lithium. It may also explain as an effect of lithium on cell permeability the excessive softness and flabbiness of all tissues in the two post-mortem examinations attended by us. Other experiments (Messer and Trautner, unpublished data) showed that lithium in concentrations which did not affect the respiration of the surviving brain cell in glucose-containing media strongly depressed the extra oxygen uptake caused by chemical (potassium or dinitrophenol) stimulation. If Gosh and Quastel (1954) are correct in assuming that this extra oxygen uptake is dependent on a "specific, potassium-sensitive phase of nerve respiration which is not prominent in the respiration of the resting nerve cell, but becomes important in the respiration of stimulated nerve", the observation could be interpreted as meaning that lithium, above a critical intracellular concentration, interferes with a functional potassium metabolism of the cell. Thus there would be two separate effects of lithium: (i) a specific effect on mineral (mainly sodium) balance, which with moderate doses is readily tolerated, but which on high doses may lead to serious depletion; (ii) a general effect on a potassium-sensitive functional metabolism of the cell, which may finally lead to a breakdown of cell metabolism. If this was the case, then sodium medication alone would in toxic conditions merely replace the sodium loss without necessarily influencing the other effects of lithium.

In considering whether the therapeutic action of lithium may be due to the ionic disturbance or to the effects on functional cell metabolism, it must first be mentioned that lithium is, in very small amounts, a normal constituent of the body. Bertrand (1951) estimated its concentration in human plasma as 17 $\gamma$  per litre, and in packed red cells as 12 $\gamma$  per litre. This unequal distribution seems to support Cade's (1949) suggestion that the ion may play a role in some unknown enzyme system. Such a function may explain the tonic effect of lithium spas listed by Glesinger (1954). With regard to its therapeutic action, however, it must be remembered that the therapeutic doses are 100,000 times higher than the biological concentrations.

The main point in favour of an ionotropic effect of lithium is the general observation that patients with acute mania reacted only to doses of lithium high enough to cause, at least initially, an acute disturbance of ionic equilibrium. Miller (1945) recorded the beneficial effect of a salt-free diet in tension states, and we observed that acute sodium losses (as in sweat) may precipitate the onset of grave toxic symptoms in patients receiving lithium treatment. In this context it may be mentioned that in the experience of all observers the basic salts, lithium



carbonate and lithium citrate, gave better clinical results than the neutral chloride. These observations are taken as pointing to a distinct role of mineral and related disturbances in the pathogenesis of acute mania, and it may be suggested that lithium treatment acts to a certain extent by restoring to normal a disturbed electrolyte metabolism. This interpretation would explain the following observations: (i) the surprising variability of the therapeutic doses as determined by the varying magnitude of the basic disturbance; (ii) the change of lithium tolerance with the change of the psychotic condition; (iii) the observation that, early in the treatment, the patients promptly relapse if their lithium treatment is stopped.

On the other hand, in non-acute conditions of psychotic agitation, sedation was effected and maintained with lithium doses low enough to exclude any significant influence on ionic equilibrium. This sedative effect of 10 to 15 milliequivalents of lithium per day was not counteracted by simultaneous sodium medication. It appeared to be independent of the ionic balance, and may well represent a general effect on the functional activities of the nerve cell, which, on higher doses, may lead to the toxic effects recorded in lithium poisoning.

At the present state of the investigation it is not possible to discern to what extent the beneficial effect of lithium in a variety of psychotic conditions is due to the ionic disturbance resulting in mild sodium depletion, or to a specific intracellular effect on the functional metabolism of the nerve cell resulting in sedation. It is hoped that a more detailed and prolonged investigation of selected patients may help to elucidate these factors, and possibly to give more insight into the basic disturbances which underlie the clinical picture of psychotic agitation.

#### SUMMARY.

1. The effect of lithium treatment on the sodium, potassium and chloride balance in man has been investigated. Observations on patients receiving lithium medication are recorded in so far as they supplement or modify the observations made on the healthy.

2. Of the ingested lithium, 90% to 95% could be recovered from the urine. Of a single dose of lithium, 30% to 60% was excreted within six to eight hours after ingestion, and the rest very slowly during the next fortnight. The lithium retained appeared to be equally distributed between the extracellular fluid and the tissue.

3. After the ingestion of lithium there was a disturbance of water and ionic balance, cation (mainly sodium) excretion exceeding anion excretion. This disturbance exceeded in magnitude the equivalent of the lithium ingested; it was demonstrable for about two days, but was possibly of longer duration.

4. On prolonged moderate lithium ingestion, up to 30 milliequivalents per day, the daily lithium excretion increased until it equalled the ingestion, and the ionic disturbances decreased until they were no longer detectable with the methods used. A stable state was thus reached and maintained without discomfort. The criteria of the stable state are recorded.

5. The basic lithium retention during the stable state amounted to one to one and a half daily doses. The plasma lithium levels could be correlated to the dose on the assumption of near-equal plasma-tissue distribution of the retained lithium.

6. In patients on prolonged high doses, over 50 milliequivalents per day, a stable state was not always safely reached or maintained. No actual ionic depletion was observed, but the plasma sodium levels tended to be low, and the patients were clinically unstable in so far as changes in the underlying mental condition, intercurrent illness or stress were likely to cause abrupt toxic complications.

7. The early symptoms of lithium poisoning are described. There was no constant relation between dose and toxic or therapeutic level. The danger level appeared

to lie at about three milliequivalents of lithium per litre of plasma, and the lethal level between four and five milliequivalents per litre; but the relation between dose and plasma level and the stability of the latter seemed to be more important than the absolute values.

8. Six out of 300 patients showed apparently inherent anomalies in their reaction to lithium, in so far as they either accumulated or excreted it in considerable excess of the amounts accumulated or excreted by other patients receiving the same dose.

9. The significance of the findings in relation to the therapeutic action of lithium is tentatively discussed. The investigation is being continued.

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## Reports of Cases.

### RETROPERITONEAL HÆMORRHAGE IN PREGNANCY.

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RETROPERITONEAL HÆMORRHAGE associated with pregnancy must be of very rare occurrence. When, in addition, there is the development of acute hydramnios and toxæmia with placental separation occurring coincidentally, the picture becomes very confused and diagnosis and management become a real problem. The interest associated with such a combination of pathological conditions warrants the reporting of the following case.

#### Clinical Record.

I was asked to examine Mrs. B., aged forty years, on the morning of September 24, 1954. The patient, who had one child, was under the care of Dr. K. Gray, to whom I am indebted for earlier obstetrical notes of this her second pregnancy. Her first pregnancy had been associated with moderately severe toxæmia, necessitating induction of labour fourteen days before term. The early part of this pregnancy, for which the expected date of delivery was December 30, had been associated with moderately severe hypertension; but when the patient was examined on September 9 her blood pressure was 130 millimetres of mercury, systolic, and 85 millimetres, diastolic, and the urine was clear. The uterus was enlarged to the size of a twenty-six weeks' pregnancy, and everything appeared to be normal.

On the afternoon of September 23 the patient had been seized with acute pain in the left loin when hanging out clothes. A conveniently near medical practitioner was asked to examine her, and diagnosed left renal colic, and gave an injection of morphine. He, when questioned later, stated that the size of the uterus was then in keeping with her expected date of confinement. Later that night the pain continued and the patient was admitted to hospital. When she was examined by Dr. Gray in the early hours of September 24, her blood pressure was 170 millimetres of mercury, systolic, and 100 millimetres, diastolic, "heavy" albuminuria was present, and the patient appeared to be in a state of shock and suffering from blood loss. There was pronounced tenderness in the left loin, and the uterus was now the size of a thirty-six weeks' pregnancy, and tense and tender; there was no vaginal bleeding. Fœtal movements, which had been active, had not been felt for some hours. The fœtal heart was not heard.

When I examined the patient, the foregoing findings were all confirmed. Generally, the patient's condition suggested a combination of shock and hæmorrhage, and one felt that the diagnosis must be that of a large concealed accidental hæmorrhage. Vaginal examination revealed no bleeding or cervical dilatation. Rupture of the membranes under minimal "Sodium Pentothal" anaesthesia was decided on.

Rupture of the membranes resulted in a gush of an excessive amount of clear liquor, which reduced the size of the uterus to that of a twenty-four weeks' pregnancy. There was no bleeding. A temporary improvement in the patient's condition resulted, and an intravenous drip administration of "Pitocin" was commenced. About two hours later her condition had deteriorated again. The report of a hæmatologist had by now been obtained. There was definite evidence of anæmia, but the serum protein balance was much more suggestive of a long-standing anæmia rather than of sudden blood loss. A blood transfusion was commenced, with some improvement in the patient's condition; but by 4 p.m. this was still far from satisfactory. The uterus was contracting, but there was little evidence of progress in labour. Abdominal pain and tenderness persisted still chiefly about the left loin.

It was thought that some extrauterine complication existed, and as the findings did not suggest intraperitoneal hæmorrhage a diagnosis of retroperitoneal hæmorrhage was made. In an endeavour to link this with the acute uterine distension known to have taken place, it was decided that rupture of the left ovarian vein was the source of the bleeding.

Operation was performed at 5 p.m. When the abdomen was opened there was a small amount of blood in the peritoneal cavity. Hysterotomy was performed, and it was found that the anterior part of the placenta was completely separated from the uterus, but with minimal bleeding. The uterus was pulled to the right, and retroperitoneal hæmorrhage was seen to be present at the outer end of the left broad ligament, extending up the paracolic gutter and becoming more pronounced in the renal pouch. The peritoneum was incised at the level of the lower pole of the kidney, and some handfuls of clot were evacuated. This procedure disclosed the left ovarian vein bleeding freely about five centimetres below its junction with the renal vein. The vein was clamped and the lower end was ligated. When the ligature around the upper end was being tied, it cut through the vein wall, and when the end was again clamped, proximity to its union with the renal vein was such that a further attempt at ligation was considered too dangerous. The clamp was therefore left applied with some "Gelfoam" around the point, the handles being brought out through the incision, which was then sutured.

At the completion of the operation the patient's condition was satisfactory. The clamp was removed thirty-six hours later, with no indication of further bleeding.

Convalescence was subsequently smooth, but the stay in hospital was prolonged to sixteen days because of healing being slow where the forceps were brought through the wound.

#### Discussion.

A review of available literature on the subject of retroperitoneal hæmorrhage of pregnancy indicates a dearth of reports in recent years. The most recent reference found was a paper by Zummo *et alii* (1952). They report 44 cases and add four more of their own. Of these patients only seven survived, the majority of cases of hæmorrhage being associated with aneurysms of the splenic and renal arteries.

Fatal retroperitoneal hæmorrhage occurring on the fourth post-operative day following Cæsarean operation for retroplacental hæmorrhage is reported by Kenworthy and Ogden (1948).

Kenny and Doniach (1945) report a case of retroperitoneal hæmorrhage associated with preeclampsia.

Mention is made of most of the literature references in Zummo's paper, where it is found that a presumably pre-existing aneurysm of splenic or renal vessels has been the determining cause of the catastrophe, and as has already been indicated, the majority of cases have ended fatally.

In the case here reported the source of the bleeding and the torn ovarian vein were exposed and viewed by all present in the operating theatre. That it was a ruptured vein would have favourably influenced prognosis, and as

far as my investigations in the literature have permitted, rupture of this vessel appears to be unique. It may be suggested that there was an associated aneurysm, but nothing of that nature was visualized or palpated. Should this have been the case, cleaning out of the clot should have initiated further heavy bleeding. This did not occur, and apart from minor oozing, the application of a clamp and a ligature together with a small amount of "Gelfoam" around the upper clamp controlled all haemorrhage at operation, and the post-operative course suggested that no further bleeding occurred.

#### Summary.

1. A case is reported of retroperitoneal haemorrhage from the left ovarian vein, associated with acute hydramnios and toxæmia of pregnancy.

2. It appears that the retroperitoneal haemorrhage occurred primarily. Could there be any association between this catastrophe and the acute pregnancy complications?

3. The acute hydramnios presumably negated haematological investigations by in itself disturbing the serum protein balance.

4. The placenta was completely separated from the uterine wall, with minimal haemorrhage. Was this dependent on the hydramnios or on the "Pitocin" drip therapy?

5. Another problem associated with this case is the question whether the toxæmic manifestations were real or whether the disturbance of blood supply to the left kidney by pressure from the blood clot may have been the primary cause of the hypertension. An article by J. E. Howard (1955) on the significance of vascular lesions of one kidney in regard to hypertension prompts this query.

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#### TREATMENT OF TETANUS.

By D. L. GRAHAM,  
Yass.

A, A STATION HAND, aged twenty-eight years, was working on a tractor on November 22, 1954, when he knocked his right hand, removing two small pieces of skin. On November 26, 1954, he felt numbness in his right hand and arm, and stiffness of his shoulder muscles. On November 27, while sitting in his car, he had a generalized muscular spasm, with severe pain. On examination at 4 p.m. he was having spasms characterized by typical *risus sardonius*, *opisthotonus*, and spasms of the limb muscles. Between spasms he was conscious and rational. Any stimulus provoked immediate spasm. Typical trismus was present. Treatment consisted in immediately giving pethidine and atropine intravenously, to quieten him while an intravenous drip was being prepared. As soon as this was ready intravenous treatment proceeded with a solution of 5% dextrose containing "Sodium Pentothal", one gramme, and "Myanesin", two grammes per litre. This was run in at sufficient speed to keep the patient adequately soothed (which for the first thirty-six hours meant "lightly anesthetized") and relaxed. On the third day, when his condition had improved, a solution containing "Pentothal", one gramme, and "Myanesin", one gramme per litre, was found to be adequate. As soon as the patient was asleep and relaxed, tetanus antitoxin was given, 170,000 units

intravenously and 200,000 units intramuscularly. To combat the risk of chest complications, penicillin, 250,000 units six-hourly, and streptomycin, 0.5 gramme twice daily, were given. Tetanus antitoxin, 50,000 units twice daily, was given for five days intramuscularly. To reduce the amount of "Pentothal" required, occasionally "Pethidine" and paraldehyde were given intramuscularly. The wounds on the hand were excised. Feeding for the first three days was entirely intravenous, with dextrose-saline, "Parenamine" and intravenous vitamins. One attempt was made to pass a gastric tube, but this produced such severe laryngeal spasm that it was not felt safe to persist. Tracheotomy was prepared for, but was not necessary. As soon as the patient was conscious without spasms, he was given fluids containing a vitamin concentrate, glucose, "Casinal" and orange juice. Also, once he was conscious, oral treatment was instituted—sedation with "Carbrital", "Elixir Myanesin" by mouth to continue the muscle relaxant effect, and antihistamines to reduce serum reactions, while a diet with a high vitamin and protein content was maintained. He progressed steadily and was discharged from hospital on December 21, 1954. By February he had returned to work, fit and well. Tachycardia persisted for about a month, and it was thought wise to delay his return to work until this had completely subsided.

It was felt that recovery in this case—a severe infection, with short incubation period—was largely due to (a) the combined action of muscle relaxant and light barbiturate anæsthetic (the total amount of "Pentothal" used was nine grammes and of "Myanesin" ten grammes), and (b) the large amount of antitoxin given—870,000 units.

#### REMISSIONS INDUCED IN RHEUMATOID ARTHRITIS BY EPIDEMIC PAROTITIS.

By R. G. ROBINSON,  
Lane Cove, New South Wales.

A YEAR ago a patient suffering from rheumatoid arthritis associated with *keratoconjunctivitis sicca* (Sjögren's disease) informed me that after an extremely active onset the disease commenced to improve following an attack of mumps. She was unable to be exact about the details as to time relationship, but was emphatic that whereas the disease had been active before this illness, her condition had gradually improved since. She was certainly experiencing a complete remission at the time of the interview.

When a local seasonal epidemic of parotitis recently arose, I was able to watch two patients with rheumatoid arthritis who contracted mumps.

#### Case I.

A forty-six year old woman with rheumatoid arthritis (stage I, class II) of four months' duration contracted mumps. During the mild prodromal stage, subjectively and objectively there was a slight increase in joint activity. On the second day of the parotitis the patient was amazed to find a remarkable amelioration of the pain in her joints, with considerable lessening of joint stiffness and swelling, and a great increase in her joint movements. All this I was able to confirm when I examined her.

The parotid, submandibular and sublingual glands were affected. There was no evidence of meningeal irritation or of tenderness over the pancreas, suprarenal glands or ovaries.

Urinary 17-ketosteroids estimated on the third day of the attack of parotitis amounted to eight milligrammes in twenty-four hours.

The remission continued until the eighth day of the glandular swelling, after which the symptoms and signs of active rheumatoid arthritis gradually increased to their former state.



## Case II.

A twenty-five year old woman with rheumatoid arthritis (stage II, class II) of four and a half years' duration contracted mumps. The disease was milder than is usually seen in adults. Only one parotid gland was affected. She later informed me that her joints had been somewhat worse just before the gland became swollen, when there were no febrile prodromata.

On the fourth day the other parotid gland became swollen, and on the fifth day a remission of her rheumatoid arthritis commenced. The parotitis appeared uncomplicated. Her improvement lasted from the fifth to the ninth day. Estimation of the urinary 17-ketosteroids on the sixth and eighth days gave figures of 6.4 and 7.2 milligrammes in twenty-four hours. There was an abrupt return of the rheumatoid arthritis activity on the twelfth day.

## Discussion.

Remissions during the course of rheumatoid arthritis have been attributed to jaundice and pregnancy. Consideration of these has focused thought on the possibility of reversing the disease by stimulating the production of some protecting substance, and this led eventually to the isolation of effective adrenocortical hormones, which tend to restore to normal the constitutional effects of the disease and to protect the joints from further damage.

Jaundice is effective only if there is a serum bilirubin level of above eight milligrammes *per centum* when an antirheumatic effect may be exerted within two to three days. It appears to be the "cortisone-sparing" effect of the bile salts which is effective. I have seen the "Cushing-like" effect of jaundice in non-rheumatic people, and believe this to be a manifestation of "cortisone-sparing".

In pregnancy, stimulation of the adrenals seems to be the important factor in producing remissions, and I have observed that when a remission does not occur during pregnancy there is no "Cushing-like" effect to be noted.

Remissions have also been attributed to infections such as scarlet fever, pneumonia and typhoid fever. I have not found any record of remissions associated with epidemic parotitis in the literature. In the cases reported here, since there is no increase in the level of excreted by-products of adrenocortical hormones, it would seem that stimulation of the pituitary-adrenal mechanism is not the fundamental factor.

There is some reason to believe that a hyperimmune or hypersensitive state exists in rheumatoid arthritis. In this connexion it is of interest that during this epidemic I was informed that a child suffering from asthma and allergic bronchitis also had a temporary remission in his symptoms and signs. Apparently there was a temporary lowering of the hypersensitivity state, since all other conditions were unchanged; or there was a decrease in the antigen-antibody reaction, which would seem unlikely unless there was a decrease in the production of antibody by the reticulo-endothelial system. It may be that the reticulo-endothelial system was too busily engaged in producing antibodies against the superadded infection to continue the production of antibodies to the allergen of asthma.

This reasoning may be applied to the cases of rheumatoid arthritis described above; the fall in antibody production may have resulted in a decrease in specific antigen-antibody reaction, with a resulting decrease of production of injurious products at the tissue level being responsible for improvement in the general condition and lessening of tissue inflammation in relation to the locomotor system.

## Summary.

Three cases of remission of rheumatoid arthritis associated with infectious parotitis are recorded. The pattern of response suggested that this effect may be due to overloading of the reticulo-endothelial system causing a lowering of a hyperimmune or hypersensitive state, with a consequent lessening of the fundamental antigen-antibody reaction and a reduction in the injurious products of this reaction.

In one case at least there was no febrile reaction to which the response might be attributed, and in the two other cases adrenocortical stimulation was not apparent.

## ACUTE NON-SPECIFIC INFECTION OF THE ORBIT, WITH A REPORT OF THREE CASES.

By N. KERKENEZOV,

Lismore, New South Wales.

ACUTE inflammation of the orbit is an uncommon condition, but one in which early diagnosis and treatment are essential if the patient's vision and indeed, even his life, are to be saved.

The three following cases are presented firstly because of their rarity, and secondly because they serve to show clearly that diagnosis is dependent upon four cardinal clinical signs: proptosis, chemosis, limitation of ocular movement and oedema of the lids.

## Case I.

Miss A., aged four years, was first seen on January 22, 1955, with a history that her left eye had been sore and swollen for one week. She had had severe intermittent headaches (duration of an hour or so only) and occasional vomiting. She had been given two penicillin injections by her own doctor. There was no history of an upper respiratory tract or sinus infection.

On examination there was marked oedema of her upper and lower left lids—the upper showing a tracery of distended veins. Her eye was proptosed, but not to such an extent as to expose her cornea. The globe itself was displaced downwards and outwards, and ocular movements were restricted in all directions, especially on the medial side. There was a tender indurated mass medially, which seemed to be pointing under the skin of the lower lid just lateral to the lachrymal sac region. The fundus of the left eye was normal. The right eye (internal and external examinations) showed no abnormality. Temperature and pulse rate were normal, and remained so throughout the entire course of the illness.

An X-ray report on her sinuses was as follows: "Left acute or sub-acute ethmoiditis with a mild sympathetic thickening of the mucosa in the left maxillary antrum." This finalized the diagnosis of an acute orbital abscess secondary to an acute infection of her left ethmoidal sinus.

The patient was admitted to hospital, and the left ethmoidal sinus was opened nasally by Dr. M. Robertson under endotracheal anaesthesia. A small amount of pus was evacuated. The orbital abscess was opened by a pair of mosquito forceps inserted through a small skin incision made medially in the left lower lid. Copious pus was found.

As soon as possible after she had recovered from the anaesthetic the patient was placed on "Aureomycin", 100 milligrammes six-hourly, and heat was applied locally. There was very little change in her clinical appearance for the first twenty-four hours, but after this recovery was rapid; the eye assumed its normal appearance within three to four days. The patient was discharged from hospital at the end of one week.

When last seen, three to four weeks after the patient was discharged from hospital, except for a small scar at the site of surgical intervention, no abnormality was detected in either eye.

## Bacteriology.

Cultures of the pus from the ethmoidal sinus and from the orbital abscess produced no growth. A smear from the orbital pus was reported on as: "Pus cells present, but no organism evident."

## Case II.

Baby B., a female, aged twelve days, was first seen on September 17, 1954, with the following history. The con-

finement was normal, and the birth weight was six pounds four ounces. On the seventh day it was noticed that there was a "watery discharge" from the left eye. This gradually increased over the next several days, and in addition both the upper and lower eyelids became oedematous, the conjunctiva became chemotic and the eye proptosed. The right ear had been discharging for several days. Treatment had been with local and systemic exhibition of penicillin.

When the patient was seen on the twelfth day, the signs were typical of an acute left retrobulbar abscess (Figure I). Both the left lids were greatly oedematous and the veins of the upper lid were engorged and conspicuous. There was extreme chemosis, and an abscess appeared to be pointing in the medial fornix. The eye was considerably proptosed, and there was some loss of central corneal epithelium. The globe itself was divergent and displaced to the left, and there was almost complete loss of ocular movements. The right eye showed no abnormality externally. Both fundi appeared normal.

An X-ray examination of the ethmoidal sinuses was reported on thus: "The ethmoidal cells are pneumatized at birth. In this case, they are completely opaque on the left side and considerably so on the right side. The findings are those of acute ethmoiditis."



FIGURE I.

This report supported the diagnosis of an acute retrobulbar abscess secondary to acute ethmoidal sinusitis. Aural examination showed the infant to have acute right otitis media with the tympanic membrane ruptured superiorly.

Under endotracheal ether anaesthesia, the left ethmoidal sinus was drained nasally by Dr. M. Robertson, while the retrobulbar abscess was opened through a small incision in the conjunctiva (medial fornix) and the underlying tissues were explored by inserting a fine pair of artery forceps. This point was chosen because it was here that the abscess was pointing. Copious pus was evacuated from both sites of surgical drainage, especially from the orbit.

As the patient apparently had not responded to the penicillin already given, "Aureomycin", 25 milligrammes six-hourly, was commenced as soon as she had recovered from the anaesthetic. There was little clinical improvement until twelve hours later, but from that time onwards the condition rapidly subsided and the infant was discharged from hospital on the eighth day after operation. At no time was the temperature elevated.

When last seen, two months after the operation, external examination failed to reveal any abnormality and both fundi were normal.

The mother's history was interesting in that several days after delivery she developed an acute breast abscess which required surgical drainage on the fifteenth day.

### Bacteriology.

Cultures were made of pus taken from the patient's right ear and left retrobulbar space and from the mother's breast abscess. These were submitted to Dr. Phyllis Rountree, Royal Prince Alfred Hospital, who reported as follows:

Mrs. B., culture from breast abscess: Phage type: 7/53.

Baby B., culture from right ear: Phage type: 7/53.

Baby B., culture from left retrobulbar region: Phage type: 7 (weak reaction).

The culture from the left retrobulbar region of Baby B. was partly phage resistant, but was probably the same strain, viz., 7/53, as the other cultures tested. All strains were penicillin-resistant.

In an attempt to trace the origin of the infection, nasal swabbings were taken from all possible contacts in the obstetric block concerned, but none of the organisms recovered corresponded to the strain isolated from Mrs. B. and Baby B.

### Case III.

Mrs. C., aged thirty-one years, was first seen on November 25, 1954, with a history that some thirteen days before she had developed a boil on her left upper eyelid; this had been incised and probed three days previously. Her temperature had since then not risen above 99° F.

On examination, the visual acuity of her right eye was 6/6, while that of her left eye was 6/60. There were considerable redness and oedema of the upper and lower left lids and there was extreme proptosis. The globe itself was displaced downwards and outwards and there was almost complete loss of ocular movement. The conjunctiva was extremely chemotic. The left optic disk had a normal physiological cup, but it was almost dead white and contrasted strongly in colour with the right, which appeared normal. External examination of the right eye showed no abnormality.

An X-ray examination of the patient's left orbit was reported on as follows: "There is no evidence of any bony destruction in the wall of the left orbit. Some polypoid swelling of the mucosa of the inferior portion of the left frontal sinus is noted."

The patient was admitted to hospital with the diagnosis of acute retrobulbar infection (probably thrombophlebitis) secondary to an abscess of the upper lid.

No surgical intervention was undertaken and the patient was given "Aureomycin", 250 milligrammes six-hourly, and heat was applied locally. The condition cleared rapidly and the patient was discharged from hospital on December 6. At no stage during hospitalization was her temperature elevated, and when she was discharged from hospital the visual acuity of her left eye had returned to 6/9.

When seen again on December 23 (approximately one month after the first consultation) the eye appeared normal except for slight redness of the left upper lid. The visual acuity was now 6/6, and the left disk was now a normal pink. A further X-ray examination on this date showed no evidence of bony or periosteal reaction in the left orbit.

The patient was last seen two months after being discharged from hospital, and no abnormality whatsoever could be detected in either eye.

### Discussion.

In Case I, the infection originated in the left ethmoidal sinuses and then, spreading through the thin bony walls of these air cells, secondarily involved the subperiosteal space. The abscess formed in this space then stripped the periosteum from the medial wall of the orbit and pointed medially on the lower lid. The abscess simulated an acute dacryocystitis, but this diagnosis was completely eliminated because of the associated proptosis, limitation of ocular movement *et cetera*; these signs never occur in an acute tear-sac infection, *per se*.

The proptosis, limitation of movement and displacement of the globe were due, in this case, to a reactive oedema of

the orbit, rather than to a direct spread of the infection into the orbit itself, such spread being checked by the periosteum.

In Case II, the original subperiosteal infection had spread through the periosteum (probably by way of a thrombophlebitic process), and cellulitis and an abscess had developed in the "peripheral surgical space"—that is, the space between the periosteum and the outer surface of the muscle cone (the four recti and their muscle sheaths). The fact that the abscess pointed on the conjunctiva indicated that the inflammatory process must have involved the orbital tissues themselves.

This case is particularly interesting because of the age of the patient (seven to twelve days), the probable source of the infection (maternal breast abscess) and the baby's complete recovery.

It is in these cases, especially when the "central surgical space" (the space within the muscle cone) is involved, that complications are most prone to develop. These include not only ocular lesions—for example, corneal ulcers, optic atrophy, rapid onset of blindness, *et cetera*—but also complications in which the patient's life is at stake—for example, cavernous sinus thrombosis, cerebral abscess, meningitis, septicæmia, *et cetera*.

Both these cases (Cases I and II) support the finding that subperiosteal abscesses due to sinus disease in children most commonly occur on the medial wall of the orbit and originate in the ethmoid group of air cells. The anterior ethmoidal air cells are the only ones present at birth as depressions in the nasal mucosa.

In Case III it was thought at first that the patient had permanently lost the vision of her affected eye because of involvement of the optic nerve. Under treatment with antibiotics, however, the disk, from being almost dead white, regained its normal pink colour, and the vision returned to 6/6.

#### Summary.

Three cases of acute orbital inflammation are recorded. The cardinal signs—proptosis, chemosis, limitation of ocular movement and oedema of the lids—are stressed. Early diagnosis and treatment are essential.

#### Acknowledgements.

I am indebted to Dr. Boyd Law, Dr. M. Robertson, Dr. J. Opie, Dr. J. Shiels, Dr. W. Pook, Dr. J. Bell, Dr. Phyllis Rountree, Royal Prince Alfred Hospital, and Dr. M. Bundock, Commonwealth Health Laboratory, for their advice and practical assistance given in these cases.

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DUME-ELDER, Sir Stewart (1952), "A Text Book of Ophthalmology", Kimpton, London, 5: 5427.

## Reviews.

**History of the Second World War: United Kingdom Medical Series.** Editor-in-Chief, Arthur S. MacNalty, K.C.B., M.D., F.R.C.P., F.R.C.S. "The Royal Air Force Medical Services", edited by S. C. Rexford-Welch, M.A., M.R.C.S., F.R.C.P., R.A.F. Volume I: Administration; 1954. London: Her Majesty's Stationery Office. 10" x 6½", pp. 634, with 68 illustrations. Price: £3 10s.

THE author of this volume is at somewhat of a disadvantage in that most of the administrative problems common to the three services have already been discussed by the other two. However, the point of view varies, as does the emphasis on different problems, although all the volumes refer at length to the difficulty experienced in maintaining an adequate supply of medical officers: and, on the figures quoted, it would seem that the Royal Air Force fared worse than the other services. After the medical branch of the Royal Air Force was formed in 1918, aviation medicine gradually developed as a recognized specialty with its own peculiar medical problems, physiological and pathological. In the interval between the wars these increased apace because of rapid development of construction of aircraft and extension of their activities, and for their solution

there was neither experience nor precedent to guide. This was, however, the task more particularly of the Flying Personnel Committee whose activities are covered in the "Medical Research" volume. Much that is here recorded will be of interest only to those who have had experience in service medical administration, but many aspects will have a much wider appeal. Of special general interest is an account of the maxillo-facial centres at which the collaboration of the medical and dental branches was very effective. The development of centres for the treatment of burns and the subsequent essential plastic surgery is described in detail with some reference to the special efforts, particularly by mutual help, to improve morale and hasten the rehabilitation of badly burnt personnel, especially those greatly disfigured. There was gradually developed a large and highly organized system of rehabilitation with the object of "the inculcation of the will to get well". The various medical difficulties consequent on the enlistment of large numbers of female personnel are very fully and frankly discussed, and a well-deserved tribute is paid to the value and efficiency of the chaplaincy services—the padre does not often get a mention. The most interesting chapter deals with the vexed question of air evacuation of casualties. By 1945 no fewer than 400,000 sick men had been carried by British Air Forces, but in the early days of the war there was great conflict between medical and operational interests. The combatant side was slow to realize the value of air evacuation in maintaining the morale of troops, or its justification in tactics as well as in humanity and the fact that it was a vital factor in any battle, not a luxury. In the early days admittedly it was difficult to decide the priority for the few aircraft available. This section of the volume is informative and authoritative—clinical considerations and in particular selection of cases are fully discussed, and it is made quite clear that "casualty air evacuation is something more than merely putting a sick man in a plane and is at its best an operational triumph".

The development of an Air Sea Rescue Directorate to aid air crews forced to bale out over the sea was an activity designed to preserve trained manpower, to maintain morale and to save life: it amply justified itself.

This is the last and largest of the three volumes on service medical administration, and it measures up well to the high standard of its predecessors.

**The Year Book of Neurology, Psychiatry and Neurosurgery (1954-1955, Year Book Series):** Neurology, edited by Roland P. Mackay, M.D., Psychiatry, edited by S. Bernard Wortis, M.D., Neurosurgery, edited by Percival Bailey, M.D., and Oscar Sugar, M.D.; 1955. Chicago: The Year Book Publishers, Incorporated. 7½" x 5½", pp. 620, with 97 illustrations. Price: \$7.00.

ALL three sections of this Year Book have thoughtful introductions by their respective editors, in which they refer briefly to developments of major importance during the corresponding year. The journals abstracted for this volume were those received by the editors between November, 1953, and October, 1954.

The section on neurology has chapters on anatomy, physiology, pathology, infectious diseases (meningitis, encephalomyelitis, anterior poliomyelitis), vascular disturbances, degenerative diseases (multiple sclerosis, Wilson's disease, cerebral palsies of childhood, motor system diseases, spondylosis, *myasthenia gravis*, the myopathies), metabolic disorders, convulsive disorders, exogenous toxins, the neuropathies, and diagnostic and therapeutic methods.

The main subjects treated in the section on psychiatry are general topics, psychosocial medicine including social psychiatry, psychophysiological studies, electroencephalographic studies, child psychiatry, mental deficiency, schizophrenia, affective disorders, miscellaneous psychotic reactions, organic disorders (acute and chronic brain syndromes), psychosomatic disorders and psychoneuroses, military neuro-psychiatry, psychiatric medico-legal studies and therapy.

In the final chapter of the section (that on therapy) are included discussions on general problems and the evaluation of therapy, some new drugs (chlorpromazine, isoniazid, lysergic acid diethylamide, methamphetamine hydrochloride, lithium and mephenesin), electroshock therapy, insulin therapy, carbon dioxide therapy, alcoholism, barbiturate poisoning, paroxysmal convulsive disorders and neurosurgery (considered primarily from the psychiatrist's viewpoint).

The main section on neurosurgery is edited by two neurosurgeons. Chapters are devoted to lobotomy, hemispherectomy, epilepsy, stereotaxia, hyperkinesia, angiography, ventriculography, anaesthesia, hypotension, hibernation, hemorrhage, trauma, abscesses, tumours, Röntgen ray treatment,



finement was normal, and the birth weight was six pounds four ounces. On the seventh day it was noticed that there was a "watery discharge" from the left eye. This gradually increased over the next several days, and in addition both the upper and lower eyelids became oedematous, the conjunctiva became chemotic and the eye proptosed. The right ear had been discharging for several days. Treatment had been with local and systemic exhibition of penicillin.

When the patient was seen on the twelfth day, the signs were typical of an acute left retrobulbar abscess (Figure 1). Both the left lids were greatly oedematous and the veins of the upper lid were engorged and conspicuous. There was extreme chemosis, and an abscess appeared to be pointing in the medial fornix. The eye was considerably proptosed, and there was some loss of central corneal epithelium. The globe itself was divergent and displaced to the left, and there was almost complete loss of ocular movements. The right eye showed no abnormality externally. Both fundi appeared normal.

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FIGURE 1.

This report supported the diagnosis of an acute retrobulbar abscess secondary to acute ethmoidal sinusitis. Aural examination showed the infant to have acute right otitis media with the tympanic membrane ruptured superiorly.

Under endotracheal ether anaesthesia, the left ethmoidal sinus was drained nasally by Dr. M. Robertson, while the retrobulbar abscess was opened through a small incision in the conjunctiva (medial fornix) and the underlying tissues were explored by inserting a fine pair of artery forceps. This point was chosen because it was here that the abscess was pointing. Copious pus was evacuated from both sites of surgical drainage, especially from the orbit.

As the patient apparently had not responded to the penicillin already given, "Aureomycin", 25 milligrammes six-hourly, was commenced as soon as she had recovered from the anaesthetic. There was little clinical improvement until twelve hours later, but from that time onwards the condition rapidly subsided and the infant was discharged from hospital on the eighth day after operation. At no time was the temperature elevated.

When last seen, two months after the operation, external examination failed to reveal any abnormality and both fundi were normal.

The mother's history was interesting in that several days after delivery she developed an acute breast abscess which required surgical drainage on the fifteenth day.

#### Bacteriology.

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Baby B., culture from right ear: Phage type: 7/53.

Baby B., culture from left retrobulbar region: Phage type: 7 (weak reaction).

The culture from the left retrobulbar region of Baby B. was partly phage resistant, but was probably the same strain, viz., 7/53, as the other cultures tested. All strains were penicillin-resistant.

In an attempt to trace the origin of the infection, nasal swabbings were taken from all possible contacts in the obstetric block concerned, but none of the organisms recovered corresponded to the strain isolated from Mrs. B. and Baby B.

#### Case III.

Mrs. C., aged thirty-one years, was first seen on November 25, 1954, with a history that some thirteen days before she had developed a boil on her left upper eyelid; this had been incised and probed three days previously. Her temperature had since then not risen above 99° F.

On examination, the visual acuity of her right eye was 6/6, while that of her left eye was 6/60. There were considerable redness and oedema of the upper and lower left lids and there was extreme proptosis. The globe itself was displaced downwards and outwards and there was almost complete loss of ocular movement. The conjunctiva was extremely chemotic. The left optic disk had a normal physiological cup, but it was almost dead white and contrasted strongly in colour with the right, which appeared normal. External examination of the right eye showed no abnormality.

An X-ray examination of the patient's left orbit was reported on as follows: "There is no evidence of any bony destruction in the wall of the left orbit. Some polypoid swelling of the mucosa of the inferior portion of the left frontal sinus is noted."

The patient was admitted to hospital with the diagnosis of acute retrobulbar infection (probably thrombophlebitis) secondary to an abscess of the upper lid.

No surgical intervention was undertaken and the patient was given "Aureomycin", 250 milligrammes six-hourly, and heat was applied locally. The condition cleared rapidly and the patient was discharged from hospital on December 6. At no stage during hospitalization was her temperature elevated, and when she was discharged from hospital the visual acuity of her left eye had returned to 6/9.

When seen again on December 23 (approximately one month after the first consultation) the eye appeared normal except for slight redness of the left upper lid. The visual acuity was now 6/6, and the left disk was now a normal pink. A further X-ray examination on this date showed no evidence of bony or periosteal reaction in the left orbit.

The patient was last seen two months after being discharged from hospital, and no abnormality whatsoever could be detected in either eye.

#### Discussion.

In Case I, the infection originated in the left ethmoidal sinuses and then, spreading through the thin bony walls of these air cells, secondarily involved the subperiosteal space. The abscess formed in this space then stripped the periosteum from the medial wall of the orbit and pointed medially on the lower lid. The abscess simulated an acute dacryocystitis, but this diagnosis was completely eliminated because of the associated proptosis, limitation of ocular movement *et cetera*; these signs never occur in an acute tear-sac infection, *per se*.

The proptosis, limitation of movement and displacement of the globe were due, in this case, to a reactive oedema of

the orbit, rather than to a direct spread of the infection into the orbit itself, such spread being checked by the periosteum.

In Case II, the original subperiosteal infection had spread through the periosteum (probably by way of a thrombophlebitic process), and cellulitis and an abscess had developed in the "peripheral surgical space"—that is, the space between the periosteum and the outer surface of the muscle cone (the four recti and their muscle sheaths). The fact that the abscess pointed on the conjunctiva indicated that the inflammatory process must have involved the orbital tissues themselves.

This case is particularly interesting because of the age of the patient (seven to twelve days), the probable source of the infection (maternal breast abscess) and the baby's complete recovery.

It is in these cases, especially when the "central surgical space" (the space within the muscle cone) is involved, that complications are most prone to develop. These include not only ocular lesions—for example, corneal ulcers, optic atrophy, rapid onset of blindness, *et cetera*—but also complications in which the patient's life is at stake—for example, cavernous sinus thrombosis, cerebral abscess, meningitis, septicæmia, *et cetera*.

Both these cases (Cases I and II) support the finding that subperiosteal abscesses due to sinus disease in children most commonly occur on the medial wall of the orbit and originate in the ethmoid group of air cells. The anterior ethmoidal air cells are the only ones present at birth as depressions in the nasal mucosa.

In Case III it was thought at first that the patient had permanently lost the vision of her affected eye because of involvement of the optic nerve. Under treatment with antibiotics, however, the disk, from being almost dead white, regained its normal pink colour, and the vision returned to 6/6.

#### Summary.

Three cases of acute orbital inflammation are recorded. The cardinal signs—proptosis, chemosis, limitation of ocular movement and oedema of the lids—are stressed. Early diagnosis and treatment are essential.

#### Acknowledgements.

I am indebted to Dr. Boyd Law, Dr. M. Robertson, Dr. J. Opie, Dr. J. Shiels, Dr. W. Pook, Dr. J. Bell, Dr. Phyllis Rountree, Royal Prince Alfred Hospital, and Dr. M. Bundock, Commonwealth Health Laboratory, for their advice and practical assistance given in these cases.

#### Reference.

DUKE-ELDER, Sir Stewart (1952), "A Text Book of Ophthalmology", Kimpton, London, 5: 5427.

## Reviews.

**History of the Second World War: United Kingdom Medical Series.** Editor-in-Chief, Arthur S. MacNalty, K.C.B., M.D., F.R.C.P., F.R.C.S. "The Royal Air Force Medical Services", edited by S. C. Rexford-Welch, M.A., M.R.C.S., L.R.C.P., R.A.F. Volume I: Administration; 1954. London: Her Majesty's Stationery Office. 10" x 6½", pp. 634, with 68 illustrations. Price: £3 10s.

THE author of this volume is at somewhat of a disadvantage in that most of the administrative problems common to the three services have already been discussed by the other two. However, the point of view varies, as does the emphasis on different problems, although all the volumes refer at length to the difficulty experienced in maintaining an adequate supply of medical officers: and, on the figures quoted, it would seem that the Royal Air Force fared worse than the other services. After the medical branch of the Royal Air Force was formed in 1918, aviation medicine gradually developed as a recognized specialty with its own peculiar medical problems, physiological and pathological. In the interval between the wars these increased apace because of rapid development of construction of aircraft and extension of their activities, and for their solution

there was neither experience nor precedent to guide. This was, however, the task more particularly of the Flying Personnel Committee whose activities are covered in the "Medical Research" volume. Much that is here recorded will be of interest only to those who have had experience in service medical administration, but many aspects will have a much wider appeal. Of special general interest is an account of the maxillo-facial centres at which the collaboration of the medical and dental branches was very effective. The development of centres for the treatment of burns and the subsequent essential plastic surgery is described in detail with some reference to the special efforts, particularly by mutual help, to improve morale and hasten the rehabilitation of badly burnt personnel, especially those greatly disfigured. There was gradually developed a large and highly organized system of rehabilitation with the object of "the inculcation of the will to get well". The various medical difficulties consequent on the enlistment of large numbers of female personnel are very fully and frankly discussed, and a well-deserved tribute is paid to the value and efficiency of the chaplaincy services—the padre does not often get a mention. The most interesting chapter deals with the vexed question of air evacuation of casualties. By 1945 no fewer than 400,000 sick men had been carried by British Air Forces, but in the early days of the war there was great conflict between medical and operational interests. The combatant side was slow to realize the value of air evacuation in maintaining the morale of troops, or its justification in tactics as well as in humanity and the fact that it was a vital factor in any battle, not a luxury. In the early days admittedly it was difficult to decide the priority for the few aircraft available. This section of the volume is informative and authoritative—clinical considerations and in particular selection of cases are fully discussed, and it is made quite clear that "casualty air evacuation is something more than merely putting a sick man in a plane and is at its best an operational triumph".

The development of an Air Sea Rescue Directorate to aid air crews forced to bale out over the sea was an activity designed to preserve trained manpower, to maintain morale and to save life: it amply justified itself.

This is the last and largest of the three volumes on service medical administration, and it measures up well to the high standard of its predecessors.

**The Year Book of Neurology, Psychiatry and Neurosurgery (1954-1955 Year Book Series).** Neurology, edited by Roland P. Mackay, M.D., Psychiatry, edited by S. Bernard Wortis, M.D., Neurosurgery, edited by Percival Bailey, M.D., and Oscar Sugar, M.D.; 1955. Chicago: The Year Book Publishers, Incorporated. 7½" x 5¼", pp. 620, with 97 illustrations. Price: \$7.00.

ALL three sections of this Year Book have thoughtful introductions by their respective editors, in which they refer briefly to developments of major importance during the corresponding year. The journals abstracted for this volume were those received by the editors between November, 1953, and October, 1954.

The section on neurology has chapters on anatomy, physiology, pathology, infectious diseases (meningitis, encephalomyelitis, anterior poliomyelitis), vascular disturbances, degenerative diseases (multiple sclerosis, Wilson's disease, cerebral palsies of childhood, motor system diseases, spondylosis, *myasthenia gravis*, the myopathies), metabolic disorders, convulsive disorders, exogenous toxins, the neuropathies, and diagnostic and therapeutic methods.

The main subjects treated in the section on psychiatry are general topics, psychosocial medicine including social psychiatry, psychophysiological studies, electroencephalographic studies, child psychiatry, mental deficiency, schizophrenia, affective disorders, miscellaneous psychotic reactions, organic disorders (acute and chronic brain syndromes), psychosomatic disorders and psychoneuroses, military neuro-psychiatry, psychiatric medico-legal studies and therapy.

In the final chapter of the section (that on therapy) are included discussions on general problems and the evaluation of therapy, some new drugs (chlorpromazine, isoniazid, lysergic acid diethylamide, methamphetamine hydrochloride, lithium and mephenesin), electroshock therapy, insulin therapy, carbon dioxide therapy, alcoholism, barbiturate poisoning, paroxysmal convulsive disorders and neurosurgery (considered primarily from the psychiatrist's viewpoint).

The main section on neurosurgery is edited by two neurosurgeons. Chapters are devoted to lobotomy, hemispherectomy, epilepsy, stereotaxia, hyperkinesia, angiography, ventriculography, anaesthesia, hypotension, hibernation, hemorrhage, trauma, abscesses, tumours, Röntgen ray treatment,

aneurysm, the spinal canal, trigeminal neuralgia, herniated disks, malformations and the sympathetic systems.

This Year Book contains a great deal of material taken from a wide range of medical literature, and will be found of value by many different types of medical practitioners apart from the specialist immediately concerned.

**The Year Book of Orthopedics and Traumatic Surgery (1954-1955 Year Book Series).** Edited by Edward L. Compere, M.D., F.A.C.S., F.I.C.S.; 1955. Chicago: The Year Book Publishers, Incorporated. 7½" x 5½", pp. 384, with 193 illustrations. Price: \$6.00.

THIS is one of the smaller more specialized members of the Year Book series, but it will be useful and acceptable to many besides those engaged exclusively in the field of orthopedics and traumatic surgery. In a brief introduction the editor refers to a number of recent happenings of interest, although he states that no revolutionary or startling discoveries affecting the surgery of bones and joints, including the treatment of fractures, appeared during the year 1954.

The material included is grouped under the following subject headings: anatomy, embryology, physiology and pathology; congenital deformities; the epiphyses; poliomyelitis; osteomyelitis and other infections; tumours, cysts and fibrodysplasia; arthritis and rheumatism; fractures and dislocations; the spine and pelvis; the neck, shoulder and arm; the hand and wrist; the hip, leg and knee; amputations and prostheses; surgical and diagnostic technique; instruments, appliances and bone banks; miscellaneous.

Appropriately to its subject matter this Year Book is freely illustrated, with a preponderance of X-ray photographs.

**Early Care of Soft Tissue Injuries.** By the Committee on Trauma; 1954. Chicago: American College of Surgeons. 8½" x 5½", pp. 206.

THIS comparatively small but well-packed book, prepared by the Committee on Trauma of the American College of Surgeons, is the result of the need felt by the Committee for a brief manual dealing with the management of injuries other than fractures, to serve as a companion to the previously published book on "An Outline of the Treatment of Fractures". The material in it was gathered together by a subcommittee, which has called upon many societies and individuals in the United States to furnish it with suitable information. These sources are acknowledged, and the Committee graciously disclaims credit for the valuable material in the manual while accepting responsibility for any criticism which may be directed against it.

Chapters in the manual deal with general principles of the care of open wounds, first aid and early care, physical examination of the injured, the management of acute head injuries and of acute injuries of the spinal cord, the principles of treatment in severe facial injuries, the initial treatment of acute injuries of the eye, the management of acute injuries of the neck, the initial management of patients with thoracic injuries, the early care of injuries to the abdomen and to the genito-urinary tract, injuries to the soft tissues of the extremities, the management of acute peripheral nerve injuries, the care of hand injuries, amputations, open wounds of joints, vascular injuries, the treatment of burns, the early recognition and management of shock, the use of antibiotics and antisera in the treatment of acute injuries, anaesthesia in the care of the injured, and immunization as prophylaxis for tetanus and gas gangrene. This valuable manual may be regarded as the product of the best available authorities in the United States. Its simple format and handy size will add to its value, although a more substantial cover would probably be an advantage.

**Medical Greek and Latin at a Glance.** By Walter R. Agard, B.Litt. (Oxon.), and Herbert M. Howe, Ph.D.; Third Edition; 1955. New York: Paul B. Hoeber, Incorporated. 9½" x 6½", pp. 96. Price: \$1.85.

SCHOOLBOY Greek or Latin provides a working knowledge of these languages, but does not equip the first year medical student with much of the vocabulary employed in medicine. Medical terms involve many words never heard in the classroom, and some familiar words are used in their more esoteric meanings, so that the medical student invariably has to learn a large new vocabulary, whether he has studied the classical languages or not. For this reason, as well as because an apposite vocabulary is essential to the student who has not studied these languages, "Medical Greek and Latin at a Glance" is a necessary and useful little book. It is debatable, however, whether it is not easier to go

straight to a medical dictionary for the exact meaning of a word, rather than to look up its roots and then try to work out its meaning from them.

## Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Polypeptides Which Stimulate Plain Muscle", edited by J. H. Gaddum, F.R.S., Sc.D., M.R.C.S., L.R.C.P.; 1955. Edinburgh and London: E. and S. Livingstone, Limited. 8½" x 5½", pp. 148, with 34 illustrations. Price: 15s.

Based on the contributions to a symposium.

"Occupational and Related Dermatoses: Abstracts from the Literature, July, 1943, to December, 1953, Inclusive", by Donald J. Birmingham and Paul C. Campbell, junior; 1954. Public Health Bibliography Series No. 12, U.S. Department of Health, Education and Welfare. Washington: United States Government Printing Office. 9" x 6", pp. 190. Price: 65 cents.

The third of a series of bulletins published by the United States Public Health Service.

"Shearer's Manual of Human Dissection", edited by Charles E. Tobin, Ph.D.; Third Edition; 1955. New York: McGraw-Hill Book Company, Incorporated. 10" x 7", pp. 304, with 79 illustrations. Price: \$6.00.

Designed essentially for use in the dissecting room, this guide to dissection aims to point out essentials, not to be exhaustive.

"Lunacy, Law, and Conscience, 1744-1845: The Social History of the Care of the Insane", by Kathleen Jones, Ph.D.; 1955. London: Routledge and Kegan Paul, Limited. 8½" x 5½", pp. 266. Price: 21s.

The story of the first part of the reforms in care of the insane over the past two hundred years.

"The ABC of Natural Childbirth", by Barbara Gelb, with foreword by R. Gordon Douglas, M.D., introduction by Grantly Dick Read, M.D., with illustrations by Dorothea Fox; 1955. London: William Heinemann (Medical Books), Limited. 8½" x 5½", pp. 188, with many illustrations. Price: 12s. 6d.

Written from first-hand experience of the patient's point of view.

"Fractures and Joint Injuries", by Sir Reginald Watson-Jones, B.Sc., M.Ch.Orth., F.R.C.S., F.R.A.C.S. (Hon.), F.A.C.S. (Hon.); Volume II, Fourth Edition; 1955. Edinburgh and London: E. and S. Livingstone, Limited. 10" x 6½", pp. 640, with 904 illustrations, some in colour. Price: 120s.

Volume I of this fourth edition appeared in 1952.

"The Enteric Fevers, 1800-1920", by Adam Patrick, M.A., M.D., LL.D., F.R.C.P. (Edinburgh and London), F.R.F.P.S.; 1955. Edinburgh: T. and A. Constable, Limited. 8½" x 5½", pp. 46.

The Sydney Watson Smith Lecture delivered in 1954 at the Royal College of Physicians.

"Society and Criminal Conduct", by Sir David Kennedy Henderson, F.R.F.P.S. (Glasgow), F.R.C.P. (Edinburgh and London); 1955. Edinburgh: T. and A. Constable, Limited. 8½" x 5½", pp. 44.

The Morison Lecture delivered in 1954 at the Royal College of Physicians.

"Ensayo de Una Teoria Unificada de la Medicina: Patología de la Totalidad", por F. Arasa; 1955. Barcelona: Folia Clínica Internacional. 9" x 6", pp. 184, with many illustrations.

The author aims, by examination of various teachings that have been put forward in the past, to reach first principles in the understanding of disease.

"Psychiatry for the Family Physician", by C. Knight Aldrich, M.D.; 1955. New York, Toronto and London: The Blakiston Division, McGraw-Hill Book Company, Incorporated. 9" x 6", pp. 286, with 19 illustrations. Price: \$5.75.

The book is stated to provide an initial background in psychodynamics for the medical student and practising physician.



# The Medical Journal of Australia

SATURDAY, AUGUST 20, 1955.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the *Quarterly Cumulative Index Medicus*. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

## THE MEDICAL SERVICE OF PAPUA AND NEW GUINEA.

In his "public lecture" delivered in 1937 at the Adelaide session of the Australasian Medical Congress (British Medical Association) the late Frederic Wood Jones spoke on the spirit of adventure.<sup>1</sup> He began by deploring the dearth in the medical profession of men with outstanding personalities of the kind that he had known in his early years. There were, he said, in a world that accepted commonplace mediocrity as a hall-mark of respectability, few who were prepared to let their fellows know that they were non-conformists. He declared that every youth entering on the study of medicine should be a knight in armour, seeking his charter to adventure. There were some who realized that a medical qualification would enable them to live a life of adventure, not that they were necessarily dreaming of the wild places of the earth, but that they had ideals of some more romantic setting than the medical quarter of their home town. We all know how Frederic Wood Jones displayed a spirit of adventure throughout his long life—in ideas and in actions. And there are in Australia today many who were privileged to be his students, who saw how this spirit activated him, and who were given the opportunity to follow his lead. The reader may ask what this has to do with the medical service of Papua and New Guinea. We hope to show that the reference is appropriate.

In another place in this issue will be found a special article on the medical services of Papua and New Guinea. The preparation of this article is the result of conversations with Dr. John Gunther, Chief Medical Officer of the Territory, who in response to inquiries explained some of the difficulties with which he was faced, especially in the matter of medical personnel for his staff. It was thought at once that this journal might be of help to Dr. Gunther and his department if it took up the matter and set out the facts for the information especially of the younger

generation of Australian practitioners. A special article was indicated and an author was sought who was not an active member of the medical staff of the Territory. Dr. W. L. Calov, one of the directors of the Australasian Medical Publishing Company, Limited, who had previously been a member of the medical staff of the Territory, was about to make a tour of inspection of certain centres in Papua and New Guinea on behalf of another body. He readily agreed to visit medical centres on behalf of this journal and to report on the service if the approval of Dr. Gunther and of the Administrator of the Territory could be obtained. This was readily given and Dr. Calov's report, for which we are very grateful, appears over his name. We wish to discuss the report from two points of view.

The first has to do with the type of work awaiting young graduates who have sufficient imagination and enough of the "spirit of adventure" to seize the opportunity offered. This opportunity is the kind of destiny of which Wood Jones wrote as awaiting those whom we may call the elect in adventure. Those who accept the challenge will (to quote Dr. Calov) have work "full of interest" and of "infinite variety"; they will become "rich in experience of medicine and of life". They will in fact be partners in the fashioning of a new civilization. Medical practice in New Guinea, as indeed in any other place, can be almost anything that the practitioner likes to make it—he can slum his work or he can take pride in it and do it properly; he can follow its implications. We are concerned only with men of the second type; the casual doctor, the man who (to use a current and not very elegant expression) could not care less, is not wanted. The place is better without him, for if he has no undesirable personal habits, he will be likely to develop them as part of his lackadaisical equipment. The keen worker will be able to follow the clinical illnesses of his patients with completeness, for in the department there is no dearth of scientific equipment. He will become efficient in the treatment of tropical diseases and will have the opportunity to carry out field investigations, as other medical officers in New Guinea have done. He will be able to initiate and carry through investigations in preventive medicine. Further, if he is interested in ethnology or anthropology, he will find himself in a suitable field for its investigation; and study of the flora and fauna alone could occupy all his spare time. This work then is not for the sluggard, the man who wants any kind of job that is reasonably well paid. The pay is quite good. It is really better than it sounds because there is no tax on income earned in the Territory. Opinions seem to be divided on the cost of living. Undoubtedly some items of food, such as butter, tea, sugar and meat, are costly, but clothing and other necessities are not expensive. That difficulty in the recruitment of medical officers is acute is clear from the fact that large subsidies are being paid to medical students on their binding themselves to serve in the Territory for five years after graduation. We make bold to state that if students who accept these subsidies have any of the true love of science and of the spirit of adventure, they will not quit after their five years' period has passed.

So much for one aspect of Dr. Calov's report with which we are in entire agreement. We are not quite so happy

<sup>1</sup>M. J. AUSTRALIA, September 25, 1937.

about what he writes of the hospitals—he has rather “soft pedalled” his remarks. He gives praise to the Lutheran Mission Hospital at Madang, and the native hospital at Samarai is “a clean, neat place”. At the same time it is “the only government native hospital that would not strike the visitor as something revolting”. Dr. Calov indulges in some special pleading about the average native hospital—the conditions shall be “comparable with the natives’ home conditions”. Without seeing them, one is justified in saying that they should at least be clean, neat places, as is the hospital at Samarai. The reason for this state of affairs becomes clear when we read that most of the European hospitals throughout the Territory are makeshifts. No additions have been made, so far as we can discover, to the European hospital at Port Moresby since that town in its pre-war state boasted of about 600 inhabitants; the population since those days has increased—probably tenfold. A medical officer who was a patient in the European hospital at Lae describes it as dilapidated and disgraceful. The truth is that the Commonwealth Government will spend lots of money on apparatus and equipment, but practically nothing on building. There are building difficulties in the Territory, we know. However, natives should be provided with something at least a little better than they have, and Australians serving in the outposts of the Commonwealth—serving to build up this new civilization—should be adequately provided for when they are ill.

Fortunately good work in the fields of preventive and curative medicine does not wait on structures of bricks and mortar, or of wood, galvanized iron and such other materials as are used for building in the tropics. On the other hand reasonably good hospitals and laboratories are a help. The responsible department of the Commonwealth would do well to take stock and put its New Guinea house in order. (In this regard attention should be drawn to a recent publication of the World Health Organization entitled “The Rural Hospital”; it deals with building of a type which might be suitable for Papua and New Guinea.<sup>1</sup>) In the meantime there are surely sufficient young men in Australia whose desire for adventure in medicine is stronger than family tradition and a desire to make money in a highly regarded profession. The Medical Service of Papua and New Guinea awaits them.

### Current Comment.

#### AN EVALUATION OF THE ANTIBIOTICS.

A SYMPOSIUM on the newer aspects of the antibiotics has been published in *The American Journal of Medicine* for May, 1955. Maxwell Finland in his introductory remarks points out that in spite of the increased number of antibiotics which have developed, the production of sulphonamides in the United States of America has continued at a high level; this he thinks affords strong evidence that the problems of infectious diseases have not yet been solved by antibiotics. Finland also points out that whereas thousands of products, many of special value, were

elaborated by adding to the structure of the sulphanilamide molecule, very little modification of antibiotics has been possible; each has its own characteristics. While certain salts and esters of penicillin have been developed to give varying degrees of solubility or rates of release, or to incorporate antihistaminic or analgesic substances, and dihydrostreptomycin was developed in the search for a less toxic form (though its tendency to produce severe deafness limits its use), most work on the antibiotics has been rather in the way of simplification. Thus, the structure of oxytetracycline and chlortetracycline is essentially the same, and the common feature of both, tetracycline, has all the essential characteristics of these drugs. According to P. P. Regna there is likely to be a similar resemblance between erythromycin and carbomycin, though these have not yet been fully worked out. The extreme diversity of structure shown by the antibiotics has been a bar to the discovery of their mode of action; this diversity is also shown by some hundreds of other substances produced by various living organisms, all of which have an inhibitory effect on other living organisms, usually of a limited specific nature; so far no common chemical factor has been discovered, so that there exists no basis for systematic attempts to synthesize an antibiotic in the way that the recent antimalarial drugs were developed.

W. W. Umbreit discusses the mode of action of the best known antibiotics. He considers that their action is exerted in each instance on a particular reaction within the susceptible cell. In the case of penicillin, there appears to be a component in the cell wall which specifically adsorbs penicillin; its consequent inactivation produces disorganization in the metabolism of nucleic acids, with loss of the ability to synthesize protein. Streptomycin inhibits some phase of the interactions of oxalacetate and pyruvate. Nothing definite is known about the effect of chloramphenicol, while the known effects of tetracycline are not specific, and do not account for all the action of this drug. Tyrothricin and bacitracin are surface-acting, and appear to alter the physical structure of the cell, while polymyxin combines with polyphosphates within the cell. None of these reactions gives any hint as to what to look for in an agent which will attack viruses, although the ability of chloramphenicol and tetracycline to destroy the intracellular organisms of psittacosis and *lymphogranuloma venereum*, and presumably the intracellular phase of the rickettsial infections, offers some promise that there may exist an agent which would enter a cell and destroy the virus while not destroying the cell itself; after all, isoniazid is reported as being able to destroy tubercle bacilli even when they are intracellular. Meanwhile, although the antibiotics are widely used against every known form of virus infection, there is no uniformity in the results, and the frequent reports of failure cast much doubt on the reports of success. Is this a result of the patchy development of drug resistance, or could it be that the value of, say, tetracycline in virus pneumonia is due to the maintenance in the intracellular fluid of a concentration high enough to destroy some extracellular stage of the virus when it emerges on its way to invade other cells? This, after all, may be the mode of action against the rickettsias. Could it even be that suitable concentrations of antibiotics merely protect virus-weakened tissues from secondary invasion?

However, the specific action of the antibiotics on some particular reaction within the cell provides one of the explanations of resistance. V. Bryson and M. Demerec state that a large proportion of drug-resistant variants appear to arise by mutation, so that one of the mechanisms of resistance could be through decreased affinity of the cell components for the drug; alternatively, genetic changes might provide a more efficient method of synthesizing a drug-antagonized metabolite, or of synthesizing a drug-inactivating enzyme. These authors consider that these mutants could always have existed, and that a “sensitive” organism has among its numbers some potentially resistant individuals, which come to the fore when the environment is rendered selective by the presence of antibiotics. In the case of penicillin, when enormous numbers of a sensitive organism are plated out with a low concentration of penicillin in the medium, some of the few

<sup>1</sup> “The Rural Hospital: Its Structure and Organization”, by Dr. R. F. Bridgman; 1955. Geneva: World Health Organization. (Monograph Series, Number 21.) 9½" x 6½", pp. 162, with 19 figures. Price: 20s. (cloth bound).

mutants which survive can withstand a slightly higher concentration of the drug; thereafter, step by step, successively more resistant survivors can be selected. But concentrations of penicillin can be used, at first, so high that no mutant organisms survive the first plating, which affords experimental proof that penicillin should always be used, therapeutically, in high dosage. While the same step-by-step development of resistance has also been observed with streptomycin, there also exists a class of mutants, occurring in sensitive cultures, which in one stage achieve resistance to all therapeutically practicable concentrations of streptomycin (and the same applies to PAS and isoniazid). In addition, certain experiments which provide evidence of a sexual phase in *Escherichia coli* also point to the probability that streptomycin resistance is a genetically recessive trait. The use of combinations of antibiotics, one of which will probably attack organisms resistant to another, is one solution of the problem of resistance, but it has been shown that once a single resistance has developed, mutation leading to other resistances can rapidly follow. Moreover, the consecutive use of various antibiotics, as one after another is found to be ineffective, is a potent source of multiple resistance; yet this practice is regrettably common.

There is as yet no really satisfying explanation why, for instance, in patients under treatment with penicillin for an infection with a tested and proved penicillin-sensitive and non-penicillinase-producing variant of *Micrococcus pyogenes* var. *aureus*, there is a sudden and overwhelming appearance of a strain which is both penicillin-resistant and penicillinase-producing. This is a departure from the usual pattern, and mutation, whether of the step-by-step penicillin pattern or the sudden, one-stage streptomycin pattern, will not do for an explanation, though the previous use of penicillin in ineffective or unsuitable dosages is often a likely contributory factor. The effect is not unlike some sudden upsetting of the balance of Nature, where the resistant organisms move in after the ground has been cleared and competition eliminated by the action of the antibiotic on sensitive strains. The phenomenon is usually met with in sudden epidemics running through patients and staff in a hospital, and the suggestion has been made that the widespread "routine" use of various antibiotics for undefined and usually unnecessary prophylaxis is the major factor in its causation. We may observe how true it is that the prophylaxis so often provided nowadays is not against some obvious and definable, and genuinely unavoidable, infection, but against the avoidable hazards of carelessness and slipshod asepsis; and we may ask how much more undesirable and inexcusable does that question-begging word, "routine", become on each of its successive appearances.

On the other hand, as Finland points out, the correct prophylactic use of antibiotics for selected purposes is frequently justified. Given a truly sensitive organism, repeatedly proved to be so by testing from time to time, then intermittent and intensive short courses of a suitable antibiotic may be given over long periods to control streptococcal infections and hence to prevent recurrences of rheumatic fever, or to reduce morbidity in chronic urinary or bronchiectatic infections.

W. F. von Oesting, in this symposium, deals with the complications of antibiotic therapy. The most prominent feature is hypersensitivity to penicillin; and he states that it is debatable whether the hypersensitivity is so prominent because penicillin is the most extensively used drug, or because of the widespread use of the drug in a repository form. Theoretically, the repository forms permit a greater antigenic and sensitizing effect because of their slow release over long periods; alternatively, the slow release may act, in other circumstances, with a desensitizing effect. Finland suggests that some of the severe and fatal anaphylactoid reactions may have been caused through faulty technique by the inadvertent injection of these relatively insoluble preparations into a vein. The high rate of sensitization which follows topical use of the antibiotics is an important consideration. The development of aplastic anaemia after the use of chloramphenicol, and on rare occasions of streptomycin, is no real bar to

the use of these drugs—and Finland states, rather significantly, that it is well to remember that agranulocytosis is an important feature of prolonged sulphonamide therapy, and that severe haemolytic anaemia is the most striking and serious complication of sulphanilamide therapy. Nausea, vomiting and diarrhoea are unimportant accompaniments of the taking of some antibiotics, and are easily circumvented in any case, but disturbances in the normal flora of the intestines, and interference with vitamin absorption or excretion, have achieved some prominent notice; the exact position in man, as compared with laboratory animals, is not clear. Probably, under ordinary conditions, any such effects can safely be ignored. Stomatitis, glossitis, "black tongue", and *pruritus ani* are caused by several of the antibiotics. Many other effects have occasionally been described, of which the vestibular and auditory disturbances due to streptomycin and dihydrostreptomycin are the most important.

All in all, this symposium serves to illustrate the damage that can occur from the indiscriminate use of antibiotics, and to emphasize the need for restricting them to cases in which they can indubitably do good; when they have been decided on as really necessary, they should be given in full dosage. This is not new, but is becoming more and more important because of the wider appearance of resistance, so that it is well to emphasize it once again.

#### MELANOMATA OF THE SKIN OF THE HEAD AND NECK.

IN the treatment of cutaneous melanomata of the head and neck the attitude commonly and automatically taken is one of hopelessness and fatalism. However, Daniel Catlin<sup>1</sup> has reported clinical observations which, he avers, will not condone such an attitude. Catlin, who is from the Head and Neck Service of the Memorial Hospital, New York City, has found that 23% of all melanomata were in the head and neck area, but they, in turn, represented only 1.1% of all malignant tumours examined in the Head and Neck Department. The incidence of melanomata in both sexes was about equal. As with many other forms of cancer, melanomata were most common in the age group from fifty to seventy years, and the "cure rate" was highest for this group also. Catlin does not agree with the statement that melanomata are the most malignant and lethal cancers in man. On the contrary, he found all degrees of malignancy. Some melanomata remained localized for years, never metastasized, and were cured by local treatment only. Others metastasized widely and killed quickly despite the most aggressive treatment. Between these two extremes was found every conceivable variation in malignancy. Catlin considers that reported instances of malignant pigmented naevi occurring during childhood are so rare and unusual that such cases can be considered medical curiosities; his youngest patient was a fully developed girl sixteen years old. He did not find that trauma constituted an aetiological factor in the development of a melanoma. Inadequate removal of the primary melanoma at the first operation reduced the chance of cure; as with all cancers, the first operation offers the most favourable setting for a complete removal of the growth. Catlin agrees that melanomata can metastasize with equal facility by way of both the lymphatics and the blood vessels. In diagnosis, he considers that any pigmented tumour of the skin should be viewed with suspicion, especially if it has shown recent change or growth. One useful exception to the preceding statement is that if hairs are present on the surface of the tumour, the naevus is undoubtedly benign.

Surgery is regarded by Catlin as the only successful form of treatment, and in this series the policy in excision of melanomata did not differ in principle from that used in the treatment of other malignant skin tumours. The surgeon planned his incision to include a few millimetres of normal-appearing tissue at all margins around and beneath the melanoma. The five-year cure rate in the

<sup>1</sup> Ann. Surg., December, 1954.



series of 106 patients was 36% of those who could be traced. This figure, Catlin states, is better than he has obtained thus far in some of the more common forms of mouth cancer (tongue, buccal mucosa, tonsil *et cetera*). It is interesting to note the statement that the treatment of melanomata of the skin of the head and neck is more successful than in other parts of the body. A reasonable explanation put forward for the better end results is that many of the melanomata develop on an exposed surface of the body, where they are noticed earlier; treatment is then requested sooner, and metastases have not yet had time to develop. The only hope for improved results at the present time seems to lie in prompt and complete removal of more early melanomata—that is, removal before metastases have been deposited. Catlin does not support a policy of radical surgery in all cases.

#### PULMONARY RESECTION FOR BRONCHIECTASIS.

AN analysis of 215 patients suffering from bronchiectasis has been made by G. E. Lindskog and D. S. Hubbell.<sup>1</sup> Cases associated with tumours, active tuberculosis or pulmonary abscess are not included in the series. Diagnosis was verified by bronchography, examination of excised tissue, or both. In 114 instances no aetiological cause was established; of the other 101, pneumonitis was blamed for 66, pertussis for 10, other infections or foreign body for eight each and "tonsillectomy" for five. Sinusitis was demonstrated in 74 of the patients, but it is suggested that it plays a secondary rather than a primary role.

The suitability of patients for operation was based on the following criteria: there must be proved and localized bronchiectatic changes, symptoms causing discomfort, inconvenience or complications, and adequate cardio-respiratory reserve; and there must be no concurrent disease contraindicative of major surgery.

Of the 215 patients, 138 met these requirements, and on these a total of 165 resection procedures were carried out; crude mass ligation was used for only 24 of these procedures, and was then abandoned in favour of hilar broncho-vascular dissection. There were four deaths in hospital; thereafter 129 of the patients who were surgically treated and 71 of those who were not, were followed up. Of the former group 46 were well, 43 were much improved, and four had died, while of those who had not had resections done five were well, four were much improved, and there had been 15 deaths. These figures are impressive, and offer a good argument in favour of selective resection of lung in bronchiectasis.

#### DIAGNOSIS OF LEPTOSPIROSIS.

THE diagnosis of leptospiral infections is always difficult, and early diagnosis is more difficult still. The agglutination-lysis test will not demonstrate antibodies before the twelfth day; maximum titres are not found until the fourteenth to the twentieth day. Thereafter some detectable reaction persists for up to eighteen months; but certain diagnosis of current infection depends on a rising titre. Complement-fixing antibodies can be demonstrated on the tenth day, but no later than the nineteenth day. Early diagnosis, then, depends on finding the leptospira in the blood of the patient, and treatment is most effective if started early. Eugene L. Nowicki<sup>2</sup> has shown that some twenty to thirty hours after infection by leptospiræ a specific lytic agent is excreted in the urine, and continues to be excreted for about twelve days; this agent can be detected by an easy lysis test. Its activity is not constant, so that a second test is desirable. Urine samples collected on two consecutive days are filtered, their pH is adjusted to 7.0, and they are measured. They are then shaken with an equal part of acetone and centrifuged at 1500 revolutions per minute for five minutes,

after which the supernatant fluid is drained off and discarded. The sediment is resuspended in saline solution, of which one part is added for every ten parts of the original urine sample. This suspension is again centrifuged, and the supernatant fluid is drawn off and preserved with two drops of "Chinosol" solution, 1%, added to each millilitre; it can now be stored in an icebox for many days, but after storage the pH must again be checked, and adjusted if necessary to 7.0. To carry out the test, in a small test tube 0.3 millilitre of the urine fraction is mixed with an equal part of a dense suspension of leptospiræ from a culture. Controls with normal urine and saline solution are set up. The tubes are kept in the icebox overnight; after stirring, a drop from each is placed on a slide and examined in a dark field under high power. The density of leptospiræ remaining in the test mixture is compared with that of the controls; if none are left, the result is strongly positive, and if the densities are the same it is negative; intermediate grades of lysis may indicate either subclinical infections or group reactions against other species of leptospiræ.

This test provides early diagnosis by a method so simple that it can be performed by anybody who possesses a microscope and a centrifuge. Suspensions of leptospiræ can be preserved with "Chinosol" for several days, and in this state are just as effective as if alive. Its introduction should be of great benefit wherever leptospirosis is endemic.

#### INSUFFICIENCY OF THE CAROTID ARTERIAL SYSTEM.

AN analysis of the clinical picture shown by eight patients with occlusion of an internal carotid artery, coordinated with reports of similar cases reported in the literature, has resulted in the definition by C. H. Millikan and R. G. Siekert<sup>3</sup> of what they name "the syndrome of intermittent insufficiency of the internal carotid arterial system". They point out that although the symptoms of thrombosis in the internal carotid artery are definite enough and the diagnosis of the final condition is easy enough, nothing has been published about the preliminary symptoms which are usually present and which offer a warning of the imminence of thrombosis.

The branches of the internal carotid artery supply blood to the homolateral retina, frontal lobe, portions of the temporal and parietal lobes, the *corpus striatum* and the posterior limb of the internal capsule. Accordingly, depending on which particular branch is the site of some ischaemic influence, the symptoms can be very diverse. Nevertheless, these authors describe the syndrome as consisting of intermittent attacks of unilateral impairment of motor or sensory function, or both, sometimes associated with a disorder of speech or homolateral vision, or both; the patient returns to normal after each episode. Recognition of the syndrome may permit anticipatory treatment of threatened carotid thrombosis, since it occurs only in the presence of vascular disease which is likely ultimately to produce thrombosis. Convulsive activity, alterations of consciousness and signs of increased intracranial pressure are not part of the syndrome—they are indicative rather of some expanding intracranial lesion such as neoplasm, abscess or hematoma. The condition with which it is most easily confused is intermittent insufficiency of the basilar artery when premonitory episodes in this condition give rise only to unilateral impairment of motor or sensory function; when these occur on the other side in a later episode, it is probably the basilar artery which is involved. The important signs in carotid artery disease are unilateral impairment of vision with decrease in the retinal blood pressure and decreased pulsation in the common carotid artery on the same side. Dysarthria is common to both lesions, arising from upper motor neuron damage to the facial nerve in carotid involvement, and from supranuclear damage to the lower cranial nerves in basilar involvement. The treatment recommended is the exhibition of

<sup>1</sup> *Surg., Gynec. & Obstet.*, June, 1955.

<sup>2</sup> *Texas Reports Biol. & Med.*, Summer, 1955.

<sup>3</sup> *Proc. Staff Meet. Mayo Clin.*, May 4, 1955.

anticoagulant drugs as soon as the syndrome is recognized. Unfortunately, of course, this treatment is quite unlikely to do anything towards relieving the basic condition, disease of the carotid vessels, and so can be regarded only as a means of postponing the evil day, but apparently quite long periods of postponement can be obtained in this way.

### TRANSFER OF TOES TO THE HAND.

THE loss of fingers, especially of the thumb, is so disabling that any method of restoring some functioning extension to the hand is welcome. In the final reckoning no prosthesis, however ingenious, is as valuable as an intrinsic structure, however clumsy. Even the thick pincers contrived by splitting the stump of the wrist, mobilizing the lower end of the radius, and supplying it with adductor tendons, are preferable to the final artificial hand. Hence Patrick Clarkson's<sup>1</sup> report of the successful transfer of toes to the hand is very welcome. In all he has transferred 16 digits in six patients, with the loss of only one-half of one digit. Clarkson illustrates two cases—the first is that of a little girl who lost all the fingers of her left hand after severe burns; only the bases of the proximal phalanges were left. Clarkson transferred the left great toe to replace the lost thumb, attaching the flexor and extensor tendons to those of the thumb. By deepening the clefts between the finger-stumps, good opposition of the thumb to the stumps was obtained. The other patient is a boy with left congenital adactylia; in his case the five toes were transferred. The cosmetic result appears to be bad, the fourth and fifth toes seem to be redundant, and the new thumb is capable of only adduction, not opposition, but the functional gain is well worth the trouble, and the work as a whole is an example of superlative plastic surgery. Clarkson's technique certainly merits serious study.

### PROLONGED INTRAVENOUS TRANSFUSIONS.

NOWADAYS it often seems desirable to maintain an indwelling cannula for prolonged intravenous therapy, and the increased liability to clotting, together with the greater likelihood of occlusion of the vein because of continuous irritation of the intima by the needle-point, makes this procedure an awkward one; instances have occurred when all easily available veins have been used up. A. M. Rappaport, R. K. Graham and W. W. Kendrick<sup>2</sup> have recently pointed out that blood can be kept without clotting for hours in a container coated with silicone; from this, they describe how to coat polyethylene tubing with a silicone, and use it as an indwelling intravenous cannula. They use polyethylene tubing with an inside diameter of 0.023 inch and an outside diameter of 0.038 inch. A length of tubing is dipped into a solution of silicone, which is also drawn through the tubing, a 22-gauge needle and a hypodermic syringe being used. The needle is then connected to a water supply and water is run through the tubing for three hours. The tubing is then cut neatly and squarely across into six-inch or seven-inch lengths, the cut ends are dipped into the silicone, and then the pieces are submerged in a dish of running water for three hours. They are stored in test tubes containing aqueous "Zephiran" solution, 1 in 1000.

An excellent arrangement recommended by these authors is the making up of a sterile cannulation set, consisting of a length of siliconed tubing, a thin-walled 18-gauge needle one and a half inches long, a 22-gauge needle cut off squarely half an inch long, gloves, towel, a five-millilitre syringe, gauze and sulphathiazole powder. Before it is used, the cannula is well washed in sterile saline solution to remove the "Zephiran"; after sterilization of the skin the vein is punctured with the 18-gauge needle and the plastic cannula is passed through the needle until a length

of one and a half inches protrudes beyond the point. The protruding portion is held by digital pressure while the needle is withdrawn. The 22-gauge needle is then inserted into the cannula and connected to the transfusion apparatus. The entry point in the skin is dusted with sulphathiazole powder and covered with a dressing.

The obvious advantages of this method are discussed by the authors. There is no cutting down on the vein, no metal remains in the vein to cause irritation, the soft square point of the plastic tube does not irritate the intima, while it delivers blood in a straight stream without lying close to the vein wall and creating an eddy or backwater which might facilitate clotting. Moreover, blood which may linger in the cannula if the delivery tube kinks, or which may be forced back into the cannula when the patient coughs, vomits or strains at stool, does not clot because of the silicone coating. There is no doubt that the method is likely to be most useful.

While we are on the subject of prolonged intravenous therapy, attention may profitably be drawn to the point, made by *The Lancet* on June 11, 1955, that thoughtlessness in choosing the right arm in a right-handed patient for giving a transfusion may needlessly handicap the patient to a considerable degree.

### THE TRANSMISSION OF INFECTIOUS MONONUCLEOSIS.

NOTHING definite is known of how infectious mononucleosis is transmitted, but Robert J. Hoagland,<sup>1</sup> after consideration of the literature and of his own observations, has evolved a plausible hypothesis. He considers first that although numbers of cases occur among students, or soldiers in camps, they do not occur as epidemics passing from one to another within these groups, but as individual infections acquired from some independent source. It has been shown conclusively that transmission is not through food or water, by droplets, by insects, by ordinary contact or by sexual intercourse. Spraying the nose and throat, washing the mouth, or gargling with saline washings of patients' mouths and throats does not transmit the disease; it may be transmitted by blood transfusion. Epidemiological evidence among sailors at sea and military cadets with only infrequent leave periods suggests that the disease is contracted while on leave, and that the incubation period is long, from thirty-two to forty-nine days. Hoagland finally was given a clue by a history of two young people who had been together for all of one day, during which time they had both been drinking from a bottle passed rapidly around a group of acquaintances, and had also been kissing each other intimately in a manner which allowed intermingling of their saliva; the young woman developed infectious mononucleosis on the forty-fifth day, and the man on the forty-seventh day, afterwards. Since then Hoagland has obtained a history of intimate oral contact thirty-two to forty-nine days before the onset of symptoms of mononucleosis, in 71 of 73 patients; one of the others was in the habit of drinking from bottles shared by others. Investigation of the other parties to the kissing, when it was possible, did not reveal simultaneous infection, but in some instances a precedent history of mononucleosis was uncovered.

Hoagland accordingly offers the hypothesis that the infecting agent of mononucleosis is present in the saliva of people who have had the disease, and can be transmitted by direct transfer of saliva, and that the incubation period is from thirty-two to forty-nine days. He points out that this hypothesis explains the unusual age incidence (almost exclusively seventeen to twenty-five years—the age when promiscuous and intimate kissing is prevalent) and the increased seasonal incidence among college students (a few weeks after vacations). Certainly this hypothesis seems to cover all the known facts; it should not be difficult to follow it up, now that a clue to the possible epidemiology has been provided.

<sup>1</sup> *J. Bone & Joint Surg.*, April, 1955.

<sup>2</sup> *Canad. M. A. J.*, May 1, 1955.

<sup>1</sup> *Am. J. M. Sc.*, March, 1955.

## Abstracts from Medical Literature.

### SURGERY.

#### Insensible Fluid Loss During Operations.

L. REESER (*Arch. Chir. Neerl.*, Volume 6, 1954, page 313) has conducted an investigation into the insensible fluid loss from patients undergoing extensive abdominal or thoracic operations, using modern apparatus. He found that this amounted to only 80 grammes per hour during the actual operation, a loss considerably less than was expected.

#### Vagotomy and Gastric Resection for Gastro-jejunal Ulceration.

W. WALTERS, D. CHANCE AND J. BERKSON (*Surg., Gynec. & Obst.*, January, 1955) report a study of 301 patients, 143 of whom underwent vagotomy alone or combined with additional procedures; the remainder underwent either gastric resection or re-resection for the treatment of gastro-jejunal ulcer. They state that 115 patients developed gastro-jejunal ulceration after gastric resection and 186 after previous gastro-jejunostomy. In the former group the time interval between the gastrectomy and the definitive operation for the stomal ulcer was 3.7 years, whereas in the latter group the time interval between the gastro-enterostomy and the operation for the stomal ulcer was 11.2 years. Of these stomal ulcers 96.3% followed operations for duodenal ulceration, 2% those for gastric ulceration, and 1.7% those for gastric and duodenal ulceration; 91% occurred in men, the remainder in women. Radiological studies detected 50% of the stomal ulcers following gastrectomy, and 37% of those following gastro-enterostomy. A barium enema examination was able to detect all the gastro-jejuno-colic fistulae. As a result of the follow-up studies extending from one to eight years, the authors conclude that gastro-jejunal ulcers developing after gastric resection are best treated by vagotomy alone when an efficient gastrectomy has been previously performed, or by vagotomy plus gastric re-resection when the previous gastrectomy has been inadequate. Gastric re-resection alone gave good results in only 57.1% of traced cases. Stomal ulcers developing after gastro-enterostomy are best treated by undoing the anastomosis, excising the ulcer and performing an adequate gastric resection. Hemorrhage recurred after vagotomy for stomal ulcer in 10.4% of cases, whereas it recurred in only 3.4% of cases after gastric resection or re-resection.

#### Sarcoma of the Stomach.

G. JORDAN, B. BOLTON, J. HEARD AND G. WALDRON (*Surg., Gynec. & Obst.*, April, 1955) discuss 28 cases of stomach sarcoma, 21 being lymphomata, six leiomyosarcomata and one a fibrosarcoma. They state that these tumours comprise 1% to 3% of all malignant tumours of the stomach. Though the symptoms they produce are not character-

istic, pain, hemorrhage and a mass in a young patient are significant findings. The diagnosis is usually made by the pathologist rather than by the clinician. The best treatment is surgical excision plus irradiation if any tumour is left behind. The prognosis is better than that for carcinoma.

#### Abdominal Aortography.

J. BERRY, J. ROBBINS AND E. PIRKEY (*Arch. Surg.*, February, 1955) describe the use of abdominal aortography in the differential diagnosis of retroperitoneal tumours. They point out that it is of considerable help in differentiating renal from extrarenal tumours and in differentiating simple from malignant renal tumours. They hope that, combined with other urological diagnostic procedures, abdominal aortography will aid in the early diagnosis of puzzling renal conditions. The technique of this procedure is described.

#### X-Ray Examination in Retroperitoneal Tumours of Children.

H. FULTON AND W. EVANS (*Arch. Surg.*, February, 1955) state that a retroperitoneal tumour in an infant or child is usually one of three types—Wilms tumour of the kidney, neuroblastoma or teratoma. They discuss the radiological characteristics of each and how these characteristics aid in the differential diagnosis.

#### Gall-Bladder Bile Concentrations of Major Antibiotics.

E. PULASKI AND M. FUSILLO (*Surg., Gynec. & Obst.*, May, 1955) have studied gall-bladder bile concentrations of the major antibiotics following intravenous administration. They conclude that tetracycline is the empirical drug of choice for infections of the biliary system before surgical intervention, given in repeated doses of 100 to 250 milligrammes intravenously. This is of use even if the cystic duct is blocked, as it is still found in the gall-bladder bile in therapeutic levels. The drug probably reaches the gall-bladder bile in such cases by extracellular fluid exchange. This explains why antibiotics may cause the subsidence of clinical signs in acute cholecystitis.

#### An Isolated Loop of Ileum in Genito-Urinary Surgery.

L. N. PYRAH AND F. P. RAPER (*Brit. J. Surg.*, January, 1955) discuss the use of the isolated loop of ileum in genito-urinary surgery, pointing out that it may be used in three different sets of circumstances—namely, to enlarge the bladder (ileocystoplasty), to replace the ureter or ureters, and to provide a urinary reservoir. The circumstances requiring the use of each technique are detailed and the requisite operations described in full, on the basis of a series of 13 cases. The clinical results of these operations were satisfactory and in no instance was any electrolytic imbalance noted.

#### Survival in Cases of Breast Cancer.

M. BLACK, S. OPLER AND F. SPEER (*Surg., Gynec. & Obst.*, May, 1955) have studied the survival of a large series of

patients with breast cancer in relation to the microscopic structure of the primary tumour and the regional lymph nodes. From a study of 179 cases of breast cancer followed to the subject's death or for a minimum of five years after operation, the authors conclude that excellent survival rates are found when the patients have a highly differentiated primary tumour, with lymphoid infiltration in the tumour and sinus histiocytic reaction of the regional lymph nodes. In those lacking such features, a very low rate of five-year survival was found. The authors' hypothesis is that the lethality of breast carcinoma varies as a direct function of growth potentiality of the primary tumour, as shown by the nuclear structure, and inversely as a function of tumour-retarding factors visualized by sinus histiocytosis of the regional lymph nodes and lymphoid infiltration of the tumour.

#### Primary Bronchogenic Carcinoma of the Lung.

J. JONES, J. ROBINSON AND B. MEYER (*Arch. Surg.*, February, 1955) discuss 704 patients with primary bronchogenic carcinoma of the lung dealt with in the previous eleven years. They state that during this time they have failed to show any real improvement in resectability rates which remain in the vicinity of 20% only. The authors think that any improvement in resectability rates that may have occurred from increased awareness of the disease has been offset by the delays in diagnosis incident to the use of the antibiotics. Their salvage rate of patients surviving five to ten years after surgery was only 6.3%. They point out that any further improvement will depend upon getting a higher proportion of patients before the disease has spread beyond the lung. They state that, as there is no cough reflex in the segmental bronchi, peripheral neoplasms were formerly undetected until extrapulmonary extension or metastases occurred. Now they are hopeful that the increasing use of X-ray examinations of the chest in a survey or periodical physical examination will bring these peripheral neoplasms to surgical intervention when they are still operable.

#### The Migration of Sodium, Chloride and Potassium Ions Across the Mucous Membrane of the Ileum.

L. PYRAH, A. CARE, G. REED AND F. PARSONS (*Brit. J. Surg.*, January, 1955) state that after uretero-colic anastomosis, biochemical changes occur including a differential absorption of sodium and chloride ions across the colonic mucosa. This results in hyperchloremic acidosis, especially if the kidneys have been damaged by infection. The possibility that such a hyperchloremic acidosis might occur from a differential uptake of chloride over sodium ions via a loop of ileum anastomosed to the bladder was investigated by the authors by means of the radio-isotopes  $^{24}\text{Na}$  and  $^{36}\text{Cl}$ . No such differential uptake was observed. Experimentally, the authors showed that absorption of potassium would take place when a loop of ileum was anastomosed to the bladder. The conclusion



was drawn that if the kidney function was normal, homeostasis of the potassium could be achieved; but if kidney function was impaired, there would be a real danger of hyperpotassemia.

### Repair of Hypospadias.

L. T. BYARS (*Surg., Gynec. & Obst.*, February, 1955) states that by and large the results of hypospadias repair which have been published are unnecessarily poor. The objectives of such a repair are correction at pre-school age, with complete relief of ventral flexion, establishment of a full length urethra of adequate position, diameter and patency, and maintenance of normal inherent penile characteristics including appearance. The author has followed a certain technique for 87 consecutive patients; in all cases undertaken the procedure was carried to completion. The author stresses the importance of the ventral flexion as an indication for repair, and states that in all cases a minimum of two planned stages is required for repair. The first stage operation is the complete liberation of downward bending of the penis and the maximum utilization of preputial tissue which is present in excess. Urethral reconstruction is carried out at the second stage if the urinary stream is diverted. If the urinary stream is not diverted, it is safer to reconstruct the urethra at this second stage, but to correct it to the patient's own normal channel at a third planned stage. The method of urethral reconstruction is isolation of a strip of skin in the ventral surface of the penis and forming this into a tube with fine catgut in a running inverting suture. The skin is closed in depth or in tiers with fine silk in interrupted sutures. The essentials in this repair, apart from fine technique and meticulous detail of operative points including the surgical dressing, are as follows: (i) very free liberation of all flexion on the under-surface of the penis right up to the dimple of the glans and free application of preputial skin to the wide-based area; (ii) construction of the urethra with a fine inverting stitch, with closure of the skin in a number of tiers in depth; (iii) careful dressing and catheter care.

### The Treatment of Pancreatic Cysts by Internal Drainage.

I. S. R. SINCLAIR (*Brit. J. Surg.*, January, 1955) states that pancreatic cysts large enough to need treatment are so rare that the number encountered by any one surgeon is small. For this reason the relative merits of the various methods available for handling these cysts cannot be assessed on personal experience alone. In 1883 Gussenbauer described the successful treatment of a pancreatic pseudocyst by marsupialization, and this was regarded as the treatment of choice for many years. However, this method may not produce permanent relief, and internal drainage of cysts offers more immediate relief to the patient. Since Ombredanno in 1911 first used this method, sporadic reports have appeared of pancreatic cysts treated by anastomosis to a hollow viscus. Cysts have been anastomosed to the stomach, to the duodenum, to the gall-bladder, to the jejunum and to the common bile duct, the stomach having been most

often selected. The author then gives case reports of three patients in whom cysto-gastrostomy has been carried out with satisfactory immediate and late results. He discusses a classification of pancreatic cysts based on that of Mahorner and Mattson, and considers that those cysts which the surgeon is called upon to treat are in most instances pseudocysts, because they are usually the only ones to attain a size sufficient to produce symptoms or abdominal swelling.

### Chronic Obliterative Cholangitis.

M. LEE (*Post Grad. M.J.*, April, 1955) states that chronic obliterative cholangitis is a condition arising from a slowly progressive inflammatory change in the common bile duct, resulting in obliteration of the duct and the development of jaundice. It usually, but not necessarily, occurs after cholecystectomy, taking months to years to eventuate. Jaundice arising after a gall-bladder operation is usually due to a missed or a new stone in the common duct, or to injury to the common duct at the time of cholecystectomy, resulting in a benign stricture; but undoubtedly obliterative cholangitis is the real cause in many cases attributed to trauma or to a remaining stone in the common bile duct. There are several clinical signs helpful in the diagnosis in such cases. In some cases, prior to cholecystectomy, the patient may have had attacks of Charcot's intermittent biliary fever. At the time of removal of the gall-bladder, when the common duct was opened, it would have been observed that the biliary drainage was indicative of a cholangitis, the bile being sandy, muddy or gritty. The biliary fistula resulting if the duct was drained by a "T" tube might have taken weeks instead of days to close. These signs would show that active infection was present in the bile duct and that there would be a possibility of the development of obliterative cholangitis in the future. Part or the whole of the length of the common duct may be involved, and it usually occurs in cases of neglected gall-bladder disease when the inflammation has spread from the gall-bladder into the ductal system. This is thus yet another reason for the early surgical treatment of cholecystitis.

### Gastric Carcinoma.

J. MOORE AND H. MORTON (*Ann. Surg.*, February, 1955) have studied 427 consecutive cases of carcinoma of the stomach from 1941 to 1950. They conclude that the diagnosis of this condition still remains a difficult problem. All patients in their series except one had symptoms referable to the gastro-intestinal tract. Loss of weight was an early symptom and in fact was the commonest; next following were abdominal pain or discomfort and vomiting. Constipation was the chief complaint of 63 patients. It was shown that a palpable mass did not mean an inoperable growth. Barium meal X-ray examinations revealed 92% of the cases. The authors found gastroscopy and cytology by no means reliable as methods of diagnosis. From their results, they conclude that the correct treatment of carcinoma of the stomach is subtotal gastrectomy, distal for the pyloric carcinoma and proximal

for the growths of the lower part of the oesophagus, cardia and fundus. This operation should be performed even when it is considered to be only palliative. Total gastrectomy was performed in this series only when the whole stomach was involved. The authors point out that after this operation, the surgeon must be prepared for a higher post-operative mortality and a proportion of gastric cripples among the few survivors. Subtotal gastrectomy was performed on 147 patients and total gastrectomy on 16. The resectability rate was 38.2%. Subtotal resection for cure was performed on 81 patients, and for palliation on 66 patients. The overall five-year survival rate of 298 patients was 13.6% (corrected for age). There was a 37.5% five-year survival rate in the subtotal resections for cure, and a 19.5% rate in the palliative group. The lymph nodes contained metastases in 34.3% of the resections for cure, and 65.8% of the palliative resections. Considered on the basis of lymph node pathology, 10.6% of patients with "positive" nodes lived for five years, whilst 36.7% of those with "negative" nodes survived for this length of time.

### The Late Complications of Gastrectomy.

C. WELLS (*Ann. Roy. Coll. Surgeons England*, March, 1955) points out that the Pólya type of gastrectomy for simple ulcer is not likely to be followed by unwelcome complications. The mortality rate is about 1% and the recurrence rate of ulceration another 1%. Thus in 98% of cases there is complete relief of ulceration if an adequate gastrectomy has been performed. This implies removal of two-thirds or more of the stomach. Such a gastrectomy is followed by post-operative symptoms of one kind or another (other than "indigestion") in 10% of cases. The author divides these post-operative symptoms into two groups—namely, nutritional and subjective. Nutritional deficiency is common after gastrectomy and manifests itself as failure to gain weight, avitaminosis and anaemia. Subjective symptoms form the group of postprandial symptoms, which may form three entities, namely, the early syndrome (the so-called "dumping" syndrome), bilious vomiting (the "afferent loop" syndrome) and the late or hypoglycemic syndrome. The author postulates that the bilious vomiter suffers from an overt form of afferent loop syndrome and the "dumper" from a *forme fruste*. However, he points out that though dumping is mainly related to the high subtotal gastrectomy and the afferent loop, the relationship is not constant or essential, as the characteristic symptoms can occur after the Billroth I type of gastrectomy in which the stomach remnant is anastomosed to the duodenum.

### Injuries of the Liver.

G. MADDING (*Arch. Surg.*, May, 1955) points out that all suspected wounds of the liver should be explored and that adequate external drainage should be instituted. He deprecates the use of packing. He recommends that drains should not be removed until all drainage has ceased.

## Special Article.

### THE MEDICAL SERVICE OF PAPUA AND NEW GUINEA.<sup>1</sup>

#### Introduction.

THE Territory of Papua and New Guinea consists of the eastern half of the great island of New Guinea together with adjacent islands, and the islands of Buka and Bougainville, and a multitude of atolls and small island groups.

The eastern half of New Guinea is divided into northern and southern halves. The southern half (British New Guinea), together with the D'Entrecasteaux Islands, the Trobriand Islands and the Louisiade Archipelago (all lying off the south-eastern tip of New Guinea), is known as Papua. German New Guinea consisted of the northern half, together with the Admiralty Islands, the Bismark Archipelago and Buka and Bougainville (of the northern Solomon Islands) and adjacent small islands. The most important islands in the Bismark Archipelago are New Britain (formerly Neu Pommern), New Ireland (formerly Neu Mecklenburg) and New Hanover. The Admiralty group includes Manus. German New Guinea was taken by Australia early in the first World War and was administered by Australia under mandate from the League of Nations until 1946, when the League of Nations was replaced by the United Nations Organization. The term "mandate" then ceased, and Australia was granted "trusteeship" of what was formerly the "Mandated Territory of New Guinea". It was now found possible to combine the administrations of New Guinea and Papua, and we have the "Territory of Papua and New Guinea". The area of the "trust" territory is about 93,000 square miles and of Papua some 90,000 square miles. In rough figures the population consists of 13,000 Europeans, 2300 Asians (mostly Chinese and all in the "trust" territory) and 1,400,000 natives.

The greater part of the territory is mountainous and in its natural state covered with dense jungle. Here and there may be seen great hills covered with coarse grass rather than jungle; but such areas are comparatively small. In the highland country, where many generations of natives have cleared the timber for gardening, great wide treeless valleys with much softer grasses occur. All the islands except the small coral islands are mountainous and jungle clad.

Excepting on the highlands, the climate is hot all the year round. In most places the nights are cool enough to permit comfortable sleep. In some places quite cold night breezes come down from the mountains. The atmosphere is humid. The rainfall is high. Most places have a regular wet season marked by north-west squalls and heavy rain, and a dry season, from about May to September, during which the wind blows steadily from the south-east.

In the highlands the days are warm. The early mornings and nights are cool or even cold. The climate here might be regarded as ideal.

Everywhere the country is well watered by swiftly flowing streams. There are several great rivers on the mainland.

Apart from all the coral islands there is evidence of former volcanic activity everywhere. Many volcanoes are still active on the mainland and on the larger islands and some small islands. Rabaul, New Britain, which is generally regarded as the capital of the "trust" territory, is the centre of much volcanic activity. Guarding the entrance to the harbour on the eastern side is the small active Matupi crater, from which sulphurous fumes are frequently wafted in the direction of Rabaul. On the other side of the water is what is still called Vulcan Island. Prior to 1937 this piece of volcanic land rose fifteen or twenty feet above sea level. It was separated from the shore by about 400 yards of water. In 1937 it spewed forth lava and bubbled upwards and outwards. It is now 500 feet high, and an island no longer; it is covered with vegetation and is a quiet and peaceful hill.

The native peoples of the territory vary greatly in physique, customs, language and cultural standards. Their food varies with their environment and their knowledge of agriculture. The diet is predominantly carbohydrate of poor quality. But in coastal places where fish is available protein may be adequate.

<sup>1</sup>All photographs in this article have been prepared by Australian Official Photographers and are reproduced by courtesy of the Department of the Interior, Canberra, A.C.T.

The Territory of Papua and New Guinea is a sphere of unequalled interest for the ethnologist and anthropologist. Here are millions of primitive people who are just commencing to feel the impact of European culture, who are in the process of forsaking much of their ancient culture, and who are on the threshold of a new civilization. The transitional stage itself presents a fascinating study. And before the transition is complete it will be necessary for students to hasten to record particulars of the ancient culture also.

As the native peoples form the bulk of the population, and as they are the main reservoir of disease in the territory, their health is the prime consideration. But the health of European and Asian peoples presents many difficult problems also.

This preliminary superficial and scanty mention of the territory and its people in general is necessary before any attempt can be made to discuss understandably the health problems of the country and the means that are employed to tackle them.

#### Education.

Health of a community depends largely on education—that is, education in the broader sense, not merely popular education in hygiene and sanitation. The education of primitive people is a tremendous task. They have to be taught first that education is required. Then they must learn to provide their own teachers. They are naturally illiterate. A little literature—mostly religious—has been built up in some dialects as a result mainly of mission influence. But this is quite inadequate. To have any hope of achieving a broad education, these people must have access to literature in a common language. It is obviously impossible to build up a literature in each of some thousands of dialects. Let them have a language in which a literature already exists. English seems to be the language of choice. Because of the limited vocabulary and primitive grammatical construction, no native language is suitable.

Education in agriculture and animal husbandry, as well as in hygiene and sanitation, is necessary for the development of a vigorous and healthy race. In the course of generations the people will have their own schools and hospitals staffed by their own people, as well as their own industries and trading facilities. Indeed small steps in this direction have been taken already. Without these things health as it is understood in a European community is impossible.

#### History.

The health services of Papua and New Guinea have developed gradually and in a rather casual manner. Until recently there does not seem to have been a well-defined plan. At first, medical services were confined to the main centres of European administration. They spread further afield as European intrusion into the natives' domain increased. Still, many distant and sparsely populated places continued to be without medical services of any kind. In German New Guinea, medical officers were established at each of the main government stations. European hospitals were established in several places. Medical officers were assisted by partially trained men who were given the title of "medical assistant". In addition to these medical assistants, a number of people who had charge of native labour were given some training and were issued with a certificate entitling them to treat illness among their own labourers and people of neighbouring villages. In Papua a somewhat similar scheme was in operation; but it was more primitive than in the German territory. When Australia took over the mandate of the German territory, health services increased rapidly. Medical officers were posted at newly established stations and at a number of smaller centres. Medical assistants were posted to many distant places. Patrol work by medical officers and medical assistants was carried out on a large scale. In the meantime a great deal of medical patrolling was being done by individual members of the Papuan service. Since the union of the two territories the medical services of both have increased greatly. This has been mainly to the benefit of Papua, where the services had been grossly inadequate in comparison with those of the Mandated Territory.

European nurses have been employed in the European hospitals since the early days. In recent years their services have been extended to native midwifery hospitals and a department for maternal and infant welfare. They have been of great value in the training of native nurses.

#### Medical Assistants.

It is questionable whether the equivalent of the medical assistant appears in any other part of the world. Their

appellation in Pidgin is probably more accurate than their official title. They are known as "*lik-lik dokta*" (small or little doctor) to distinguish them from the medical officers, who are "*big dokta*". Their work is not merely that of an assistant to a medical officer. Many of them are stationed in the towns and large stations, where they work under the direction and supervision of a medical officer. But even here they frequently have to use their initiative and make decisions on their own responsibility. In the distant places they do the duties of a medical officer.

Most of these men have a medical background of some kind. Some have worked as sick berth attendants in the Navy; others have been in the Army Medical Corps or the medical branch of the Air Force; others have worked in general hospitals in European communities; occasional ones have been university medical students; others have got the job as a result of interest in medical work and knowledge of the natives. They vary greatly in education and culture and in their professional attitude.

They are given a short period of practical instruction at a large centre before they are sent out. So far they have not received the prolonged training that is desirable, because their services are always urgently required somewhere in the territory. The keen ones learn a great deal by experience. They become quite expert at many technical procedures, and they develop a clinical acumen that is surprising to the medical graduate on meeting them for the first time. Many of them are capable of performing major surgical operations with a good measure of skill. They are very important people to the health services of Papua and New Guinea.

#### Native Medical Orderlies.

In the earlier days selected natives were trained in first aid and given a stock of simple drugs and dressings and sent back to their villages as "*medical tul tuls*". The objective was to have a medical *tul tul* in each village. These natives received a short and sketchy training at native hospitals. In recent years several schools of training in aid-post medicine have been set up. The school is in the charge of a European medical assistant. The course of training occupies eighteen months, during which the students learn the basic principles of anatomy and physiology and practical first aid and simple hygiene, and certain special measures of diagnosis and treatment. Among other things, they are taught how to use a syringe. Endeavours are made to teach them how to recognize serious disease.

In some places language presents a difficult problem. It is especially difficult in areas that have come under control only recently. At the moment the Department of Public Health is fortunate in having at Goroka a former teacher of English at the Berlitz School of Languages at Copenhagen. He is a gifted teacher and is able to teach untutored villagers to speak and read and write *Pidgin* in a few weeks. He is in charge of the school of aid-post medicine at Goroka.

At Port Moresby the classes are conducted in English. At other centres *Pidgin* is used. A book entitled "*Aid-Post Medicine*" (in *Pidgin*, "*Aid Post Maresin*") is issued to each student. A random extract from "*Aid Post Maresin*" reads: "*Fractures. Sapos bon i brok yu ken save kuiktain. Peles i ben tumas. Em i solap, nau i no lain gut. . . Sapos bon i brok long han skru i hadwok long save gut, oisem long leg long skru.*"

In English this would read:

"*Fractures: If a bone is broken you can diagnose it quickly. The pain is severe. The limb swells and is no longer straight. . . If a bone is broken at the wrist diagnosis*

*is difficult, the same applies when a bone is broken at the ankle.*"

Native orderlies are paid a nominal wage by the Administration. They are supposed to take their normal place in village life and are not expected to work at their aid posts for more than two hours a day. Periodically they are supposed to visit the native hospitals in their respective districts for refresher courses and disciplinary purposes.

They serve a useful purpose and undoubtedly do a good deal to reduce the morbidity in their villages. There are good ones and bad ones, of course. Bad ones have been known to use their knowledge and control of drugs for extortion and to gain power in their villages.

#### Native Nurses.

So far, little has been done in the training of native women in general nursing. The most important nursing for the women to learn is in obstetrics. Efforts are being made to train them in this field. Considerable difficulties have to be faced. In the first place, except in the long-established centres such as Rabaul and Port Moresby, it is difficult to persuade native women to go to hospital for confinement. They have to be taught the value of hospital attention in what they regard merely as an interesting event. They have to learn the value of ante-natal and post-natal care. They have to learn that disaster and death are not the inevitable results of obstetrical complications. However, in Rabaul the obstetrical block is very well patronized. The local women are attached to the place. The difficulty there is to keep them away. This is a remarkable change from the old days and is a striking example of what can be done by patient efforts at education.

In the second place, it is difficult to get girls for training as nurses. The villagers do not like to lose their unattached girls from the village life for a period of three years (the time allotted for training). The girls themselves are justifiably afraid of ostracism on their return home. Possibly the villagers have not yet learnt that the economic loss of a young woman for three years is more than balanced by her value to the village community after her return.

Despite the difficulties, a good many nurses have been trained. Among the schools of training, special mention should be made of a small and very efficient school conducted by a Sister of the Order of Our Lady of the Sacred Heart at Koki, Port Moresby.

#### Assistant Medical Practitioners.

As yet in the territory there is no system of educating natives to the standard of assistant medical practitioners as in Fiji. Several New Guinea natives have done the course at Suva and have come back to practise in their own country. A number of qualified natives of other countries, also, are engaged as assistant medical practitioners in the territory.

#### The Medical Organization.

The Department of Public Health within the Administration has a medical man as its head—the Director of Public Health. Under him the department is divided into administrative and professional divisions. The head of the administrative division is a layman. He is concerned with personnel, accounts, statistics, stores, transport *et cetera*. On the professional side are the four divisions of Hospital and Medical Services, Preventive Medicine and Hygiene, Infant and Maternal Welfare, and Medical Training. Each of these divisions is in the charge of a director. Provision is made

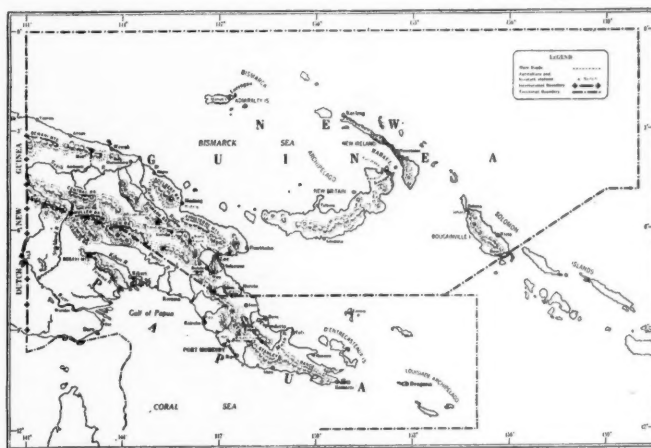


FIGURE I.

A map of Papua and the Territory of New Guinea (by courtesy of the Department of the Interior, Canberra, A.C.T.).



for specialists in various branches, particularly in surgery, tuberculosis, leprosy, malaria and pathology.

Medical officers are of two grades. Their work is of infinite variety. In outlying districts they are general practitioners as well as quarantine, hygiene and sanitation officers, tutors and hospital superintendents. Their scope is wide and their work full of interest and rich in material for research. One would think that these positions should be eagerly sought by young men with an adventurous spirit and the will to break new ground.

A medical officer's salary to commence is £1772 *per annum* and an allowance of £250 for a married man and £150 for a single man. Annual increases bring the annual salary to



FIGURE II.  
Malahang Native Hospital, Lae, New Guinea.

£2138 and allowances as a maximum for medical officers in Grade I. Medical officers in Grade II receive £2318 and allowances. Specialists receive £2498 and allowances. To qualify for Grade II the medical officer needs some additional qualification such as a diploma in tropical medicine.

Recreation leave is generous. Study leave is given freely. Medical officers are encouraged to seek higher degrees and diplomas. Full salary is paid during study leave; but medical officers are required to sign a bond before taking such leave. For example, a medical officer studying for the diploma in tropical medicine must agree to remain in the service for a further period of two years or forfeit a bond of £1000.

The service has a good pension scheme. Finally, as yet there is no income tax in the territory.

Living accommodation is provided. In all cases it is at least equal to the standard of the rest of the community.

The actual strength of medical officers in the service at present is as follows: director, 1; assistant directors, 4; medical officers, 49—total, 54. The actual number of European medical assistants at present on the staff is 96. The European nursing strength is 70.

Two dental officers are in the service. Administrative officers, clerks, storemen, technical assistants *et cetera* number 99.

In addition 3415 non-Europeans (mostly natives of the territory) are employed in various capacities.

#### Recruitment of Medical Officers.

Difficulty has been experienced in recruiting medical officers. This is not easy to understand. In these days a medical officer is not subjected to any great hardship. Living quarters are good. Fresh food is plentiful. Refrigeration is practicable in even the most remote places. Every station is able to maintain radio communication with the larger centres and with any aircraft in the vicinity. Transport is amazingly quick and efficient. Landing strips for aircraft are numerous, and appear in all sorts of unexpected places. There is no town or government station to which one cannot obtain a rapid passage by air. Facilities for recreation are good. Almost every town has its golf course. Lawn tennis, cricket, football and baseball are played. Anyone with a fondness for sailing has ample opportunity for indulging his fancy. The scenery is beautiful, glorious and

magnificent. The people of European descent are friendly and hospitable. They are mostly people with an adventurous spirit; and they are seldom dull. The native peoples are of great variety. They present a fascinating study for themselves alone. With the help of the European community they are developing a new civilization. This is a process that merits close observation. Any person taking part in this development is helping to make history.

But the greatest attraction to the medical man is the work. This is full of interest and is of infinite variety. Certainly much of it is done under rather primitive conditions; but this adds to rather than detracts from its interest. Whatever the environment, the medical officer should have no complaint about his equipment. The department's policy is to provide the best. Apart from his purely professional work, the medical officer has ample scope for intellectual activity in the study of the natives themselves and of the European communities also.

Many people unacquainted with the tropics are afraid of the climate. The coastal districts are hot and humid; but under the conditions of dress, they are not as uncomfortable as the coastal cities of the mainland of Australia in summer. In many places the south-east season is dry and comparatively cool. The north-west or summer season is hotter. Most old residents declare that the climate is better than any other. In the highlands of Papua and New Guinea the climate is delightful.

The sickness rate in the European community is probably no higher than in any part of Australia. Malaria need be dreaded no longer. Scrub typhus is a hazard in the bush only. Because of improved sanitation and the use of specific therapy, bacterial dysentery is uncommon. Amoebic dysentery is rare in the territory. Simple hygienic measures should protect the European from it.

The greatest disadvantages from the professional man's point of view are the lack of communion with his colleagues and the absence of facilities for post-graduate study under reputed masters of their subjects. But against these disadvantages may be balanced the provision of ample recreation and study leave.



FIGURE III.  
Doctor-boys, Malahang Native Hospital, Lae.

The disadvantages of professional life in New Guinea are no greater than in the outback towns of Australia. And it would seem that the advantages and interests are much greater.

In an endeavour to recruit medical officers, the Administration of the territory subsidizes selected medical students during their course from the fourth year onwards. The student receives a salary in accordance with the following scale. At nineteen years of age, £769; at twenty years of age, £880; at twenty-one years of age, £945; at twenty-two years of age, £945; at twenty-three years of age or older, £956. Subsequent advancement to £1040 *per annum* is by two annual increments of £42. Married cadets receive an additional £100 *per annum*. In return he signs a bond to remain in the service for five years if he is a fourth year student, and three years if he is a student of fifth or sixth year. This is a most attractive scheme.

### Surgery.

Every medical officer on an out-station is required to do some surgery. If a man is surgically inclined he has ample opportunity for surgical practice, no matter where he is stationed.

All the ordinary surgical diseases are encountered. Probably there is less abdominal surgery than in Australia. There is great scope for thoracic surgery.

Provision is made for the appointment of surgical specialists. At present there is one at Port Moresby only.

### Tuberculosis.

In a primitive people, such as the indigenes of the Territory of Papua and New Guinea, it might be expected that pulmonary tuberculosis, once introduced, would present a grave problem. This is so. Tuberculosis is prevalent in all parts of the territory excepting the highlands. The resistance of the natives to the tubercle bacillus is low. Nearly every patient requires treatment. Healed lesions in an ordinary survey are rare.

Provision is made for the appointment of specialists in tuberculosis. But these officers are difficult to obtain. The work provides a magnificent opportunity for people interested in this field.

The Administration is making an earnest endeavour to deal with tuberculosis. Surveys are constantly in progress. Mass radiography with 35-millimetre films is used extensively. Mass Mantoux testing is done. Great care is taken to prevent the introduction of tuberculosis into the highlands. All natives going from the highlands to the coast to work are subjected to vaccination with B.C.G. However, despite these precautions, it is difficult to see how it will be possible to protect the 300,000 people of the highlands. Sooner or later a person with "open" tuberculosis will go there to live. It may be a native returning home or an unsuspected European visiting the area. There is great scope for the practice of preventive medicine here.



FIGURE IV.

A native girl who acts as dispenser for the clinic prepares prescriptions ordered by the doctor.

Tuberculosis is recognized as a major problem in the territory. Tuberculosis hospitals are established in all the large centres. In other places special wards are used for the treatment of the disease. Conditions in hospitals generally are crude. But this is a crude country.

Modern methods of treatment are used. Special facilities for surgical treatment are available.

### Leprosy.

Leprosy is a grave problem. Presumably it was introduced many years ago by Asiatics. At any rate it is known to have existed in the territory as far back as medical records go. It is a remarkable fact that, though tuberculosis has never reached the highlands, leprosy has. It existed there

before the intrusion of the white man. The natives of the highlands wear pearl shell as ornaments and as evidence of wealth. It would appear, therefore, that they have had communication—direct or indirect—with the coast. It may be that a piece of pearl shell would take some years in its journey from the coast to the highlands, passing from village to village by barter. If shell travelled, men travelled, and during the centuries gradually spread their diseases along the lines of communication. If this idea is true, it must be assumed that the more highly infectious tuberculosis is much newer than leprosy in New Guinea.



FIGURE V.

Medical inspection.

From very early days provision has been made for the segregation of lepers. Present provision is inadequate. The only leprosarium of any size is at the island of Gemo, near Port Moresby. This hospital is staffed by nurses of the London Missionary Society. It is visited regularly by a medical officer from Port Moresby. In March, 1955, it contained 200 tuberculous patients and 80 lepers. The soil on the island is poor and the water supply inadequate. The buildings are in a sorry state. Overcrowding is gross. Other defects are apparent. But despite them the general appearance of tidiness inside the wards would do credit to any public tuberculosis sanatorium in Australia. The patients are happy, clean and well disciplined. Most of them are well nourished; many look really healthy. The nursing and most of the treatment are done by two trained European nurses and one Samoan. The routine pathological and bacteriological work is done by a native of the Solomon Islands. It is inspiring to see the quality of the work done by these devout and devoted women in the face of many difficulties at Gemo Island. Provision is made for the appointment of a leprologist in the Administration. No one holds this appointment at present.

### Infant and Maternal Welfare.

Great developments in infant and maternal welfare have taken place since the second World War. As a result of the activities of the Department of Public Health, native women in some parts of the territory have come to appreciate the importance of having medical attention at parturition and obtaining advice on the health of their babies and young children.

A medical officer engaged full time on the work is in charge of the division of infant and maternal welfare. A second medical officer is engaged full time at Port Moresby. In a number of districts specially trained European nurses are employed.

There are obstetrical beds in most of the native hospitals; but only in Rabaul and Port Moresby is much obstetrical work done among the natives. Taboos and prejudices are not easily overcome.

Probably the greatest advances have been in the guidance of mothers in the care of their infants and young children. It is here that the nurses are of great service. Clinics have been set up in all the main centres. Mothers living

in the towns and surrounding villages are encouraged to visit these clinics regularly. In addition, clinics are conducted at regular intervals in many villages. The greatest obstacle in the work is the failure of some of the women to attend unless their babies are sick. However, large numbers attend regularly. The value of the work can be reckoned on the greatly increased proportion of fat and flourishing babies in the villages that are regularly visited by the nurses of the department. Malnutrition is prevented and malaria is treated early. Malaria and dysentery are the two greatest causes of invalidity and death in infancy and early childhood. The mothers are taught simple hygienic measures to overcome these diseases and they are given facilities for treatment.

Excellent pictorial charts are posted in the clinics, to show the requirements in nourishment for pregnant and nursing

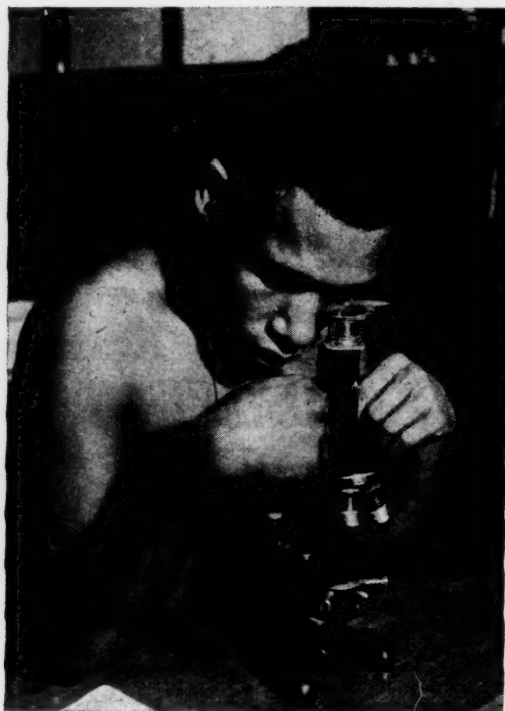


FIGURE VI.  
Native laboratory assistant.

mothers and for children, and also to illustrate the signs of disease and how to prevent it. A rather ironical feature of a chart showing food values is the beautifully drawn picture of a poisonous fish; presumably the poisonous fish (as a thing of no value) was given to the artist as a model.

In the towns clinics have been set up for the benefit of Europeans and Asiatics also. A feature of infant welfare work in Port Moresby is provision for the care of the child of European parents in the years immediately preceding school life. Many young mothers go to work. If no such provision was made, either the women would not be able to go to work or their children would have to be left to the care of native servants. Children before school age have little opportunity of mixing with their fellows. They run the risk of being lonely and spoilt and frustrated. To overcome these defects a special school (if it may be so called) has been set up. It has proved to be of great value.

#### Native Hospitals.

To the visitor inexperienced in tropical countries the native hospitals with several exceptions present a shocking appearance. They are crude and poorly lit. At the best they are built of timber and iron and have concrete floors. At the worst they are shakily constructed, native fashion, with floors of earth or, to provide a touch of refinement,

crushed coral. The beds are of wooden battens, or, in some places, laced bamboo. At Samarai the native hospital has wooden floors. It is a clean, neat place. Probably in the whole of the territory it is the only government native hospital that would not strike the visitor as something revolting. The native hospital at Port Moresby is built over the water. Sanitation is thereby simplified. But it is a gloomy place. The native hospital at Rabaul consists of buildings that formerly were occupied by Japanese prisoners of war. It is a rather dilapidated place.

The prize for native hospitals must go to the Lutheran Mission at Madang. This is far ahead of any of the government native hospitals. It is bright and airy. The walls are of fibro, roofs of iron, floors of concrete. The beds are wooden and are easily movable for washing and disinfection. Each bed has a sheet. A large septic tank system has been installed. The latrines are inside the building and are clean and tidy. This is the only native hospital in which a serious attempt is made to keep adequate case records.

Now all this sounds dreadful. But there are several important circumstances that influence the type of native hospital and that would not be appreciated by the casual observer. In the first place, if the Government was to build only elaborate and substantial hospitals very few would be built at all. Furthermore, it would be only in the more sophisticated centres that such hospitals would be appreciated.

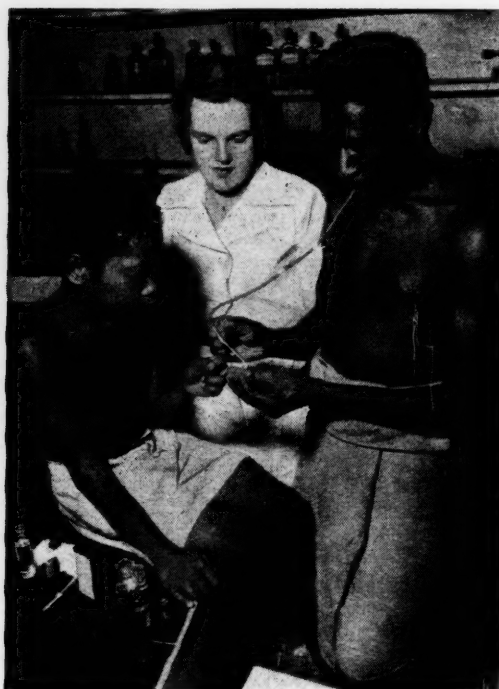


FIGURE VII.  
At the Native Hospital a medical orderly takes a blood specimen from a young patient.

ated by the natives. They have to be educated to the standard of high-class hospital accommodation. In the communities that have most recently come under the control of the Administration, it is necessary to have hospital conditions that are comparable with the natives' home conditions. In the highlands, for example, the natives live at home in semi-darkness with a slow fire on the earthen floor of the room. At the hospital they have similar conditions. They are happy to come to hospital. But if they had a bright, sparkling hospital, white and dazzling, and cold, they would not come. In the course of time, no doubt, more hygienic and satisfactory hospitals will be constructed everywhere, and the natives will have been educated to an appreciation of them. For the present, it is obviously better policy to build as many hospitals as can be staffed, in all parts of the territory. At the same time it seems that



insufficient interest is shown in raising the standard of native hospitals. Samarai Native Hospital and the Lutheran Mission Hospital at Madang are examples of what can be done with them. Many others could be developed similarly.

Whatever has been written above, it is stressed again that higher and higher standards must be set and the natives educated up to them.

Despite the low standard of hospital accommodation the standard of the medical and surgical work done in the native hospitals is high. It is as high, probably, as in an Australian country hospital. Surgical work in primitive conditions, with poor lighting, in a theatre with roof of grass, walls of bamboo and floor of earth, is generally well done and gives satisfactory results.

There is no shortage of equipment or of drugs.

Many native hospitals are in the charge of medical assistants, who frequently find themselves faced with problems beyond their capacity. They are then able to seek advice from the nearest medical officer by radiotelephone. If necessary, the patients can be transported rapidly to a hospital in charge of a medical officer. It is quite common to see a sick native carried aboard an aircraft making a routine flight. It is common also for aircraft to make special trips or to make special landings to pick up native patients. Patients are sometimes taken great distances by air for special treatment at one of the larger centres.

It has been suggested that in New Guinea there should be a "flying doctor" service as in Australia. But the two countries are not comparable. Closely settled areas in Australia are well provided with medical services. The "flying doctor" is required only in the sparsely populated areas of the great outback. In New Guinea there are no such vast areas. In the great wide spaces of Australia the preparation of landing strips for aircraft presents no great problem. In the greater part of New Guinea the preparation of an airstrip is a big job—not one that could be undertaken with any hope of urgent completion in such an emergency as acute illness. Probably the territory is provided with a greater number of airstrips than any other country with a comparable population. Communication by radiotelephone is rapid and efficient, and transport by air is readily available. It would seem that further development of radio and aerial communication would be of greater value than the institution of a "flying doctor" service.

#### European Hospitals.

Most of the European hospital buildings throughout the territory are makeshifts. On the whole they are comfortable enough from the patient's point of view; but the working conditions are not good. The operating theatres are terribly hot. The out-patient departments are rather crude. But these defects are more than offset by the quality of the work, which is of a high standard.

Medical officers in the service of the Administration may be consulted in the out-patient departments of the European hospitals. A nominal fee is charged by the Department of Public Health. Radiographic facilities are available. The services of trained pathologists are available at the larger centres.

#### The Missions.

The Christian missions of various denominations all have health activities of greater or less extent. Some of them do splendid work as at the Roman Catholic maternity hospital at Koki, the London Missionary Society's leper station at Gemo, the Lutheran native hospital at Madang, the Roman Catholic native hospital at Vanapope, and the Anglican native hospital at Erero. There are many others.

The missions do not have many medical officers. Most of the medical work is done by trained nurses. And this work cannot be praised too highly. The quality of work done by some of these women is truly amazing.

The missions could help greatly by extending their medical activities. They could do more than they are doing. But they feel, of course, that their first task is to carry the Gospel to the natives. Any extension of mission work is towards this end. Funds are limited. However, the missions are very close to the natives in every way, and they have unequalled opportunities for the practice of medicine in its various fields among them.

The Administration is helpful to the missions in their health activities, supplying all necessary drugs and dressings and providing funds for the maintenance of sick people in hospital.

#### Private Practice.

A few medical practitioners are engaged in private general practice in Rabaul and Port Moresby only. In addition there is a medical officer at Bulolo employed full time by the Bulolo Gold Dredging Company, Limited. Incidentally, the native and European hospitals at Bulolo are equalled by only those of the Lutheran Mission.

Private medical practitioners have the right to use the European hospitals, and they can charge private fees to their patients there.

There are no specialists in private practice.

The standard of private medical practice is comparable with general practice in Australia.

#### Hygiene.

In a country where dysentery, malaria and dengue are endemic, stress has to be placed on hygiene. Every medical officer of the Administration is a hygiene officer. Every European medical assistant and every native medical orderly are instructed in the rudiments of hygiene and sanitation. In the larger towns sanitation officers are appointed.

All the towns are well drained. As a result of constant inspection few breeding places for mosquitoes can be found in any of the towns. Adult mosquitoes in general and *Anopheles* in particular are dealt with by the so-called "residual spraying". Houses are treated with an insecticidal mist.

In antimalarial hygiene, probably the most important activity of the Department of Public Health is the Malaria Prevention School at Minj, in the Central Highlands. This school is mainly for European medical assistants. The course occupies six weeks and consists of the study of mosquitoes (with stress on the anophelines), methods of prevention of malaria, the pattern of the disease, and so on. The school is well conducted and well equipped. The laboratory is excellent. The institution brings great credit to the Department of Public Health.

Minj is probably a very good place to have such a school. It is in new country, where there are illustrations of how malaria is spread by the advancement of civilization. It is isolated from the distractions of the social life of the large coastal towns. It is in a cool climate, where study is much easier than in the hot and humid weather of the coast.

It is of interest that at the Malaria Prevention School one of the laboratory technicians is a local woman who a few years ago had never come in contact with white men. She is expert at her job and is able speedily to identify specifically any of the local mosquito larvae and imagines. She is expert in the use of the microscope and the mounting of specimens. During the week she works in her cotton lava lava and "Mother Hubbard" smock. At the week-end she discards her clothes, and dresses and decorates herself native fashion.

The disposal of nightsoil is generally by burial in trenches. Pan closets are used. Pans are emptied daily. At Madang the pans are emptied into the ocean. Many houses, hotels and hospitals have septic tank systems.

#### Conclusion.

The Administration, through the Department of Public Health, deserves the congratulations of all and the thanks of the New Guinea community for the magnificent work that is being done in the face of great difficulties. Australia can be proud of this service.

The health service of the Territory of Papua and New Guinea is one in which any medical man might be happy. A man would not grow wealthy in the service; but he would have a comfortable living and would become rich in experience of medicine and of life. No work could be more attractive. Recreation leave is ample. Study leave is generous.

To young men who prefer a salaried job to private practice, this service is commended. It is commended also to students, for the financial assistance it may give them during their course, as well as the assurance of a satisfactory career after graduation.

It would not be right to close this account without a word of praise for the medical men from Europe who have contributed so much to the efficiency of the service in the post-war years. These men could not obtain registration in Australia. They were given positions in the Administration of the Territory of Papua and New Guinea, and on the whole they have proved worthy. Some of them are highly

qualified and efficient. It would not be too much to say that they have saved the Department of Public Health.

In a primitive country among primitive people, much of the work is done in a primitive fashion under primitive conditions. It is all the more creditable to the members of the service that the work is done so well.

June, 1955.

W. L. CALOV.

## Out of the Past.

*In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.*

### A TRIP TO THE HAWKESBURY.<sup>1</sup>

[From the letters of Joseph Arnold, M.D., F.L.S., March 18, 1810.]

I HAVE lately been an excursion forty miles in the country when I had an opportunity of seeing those parts of it that are cultivated and grow corn. I stopped 3 days at a town called Paramata about 20 miles up a river at an acquaintance of mine Capt. Murray Commandant there. On the 3rd day Governor Bligh came up on his way to his estate, and as I knew nothing further of him than a formal introduction and dinner at his house afforded me, I was not surprised that he looked very sour at my being so far from my ship, without having obtained leave from him. But when there a gentleman, Mr. B. Campbell, offered me a part of his gig to go twenty miles up country to a settlement called Greenhills I ventured to ask his consent which he granted. I therefore made a part of his cavalcade for we were all going to the same place; and in spite of thick forests and deep lagoons we arrived at our place of destination at about ten at night. Although the coach was drawn by four strong horses yet we stuck fast in several places: and at one time having accidentally left the main road in the dark, we were some time before we could find it again. The town of Greenhills is beside a river about the size of the Thames called Hawkesbury. It is very winding in its course, so that the place is not above thirty miles from the sea in a straight line, yet the course of the river is 100 miles from which circumstance there being little descent for the water, and the entrance into the sea being narrowed by rocks the occurrence of floods is very common. I was there when 18 hours rain made the flood 14 feet: by which you may judge how suddenly these floods come on, and their magnitude you may judge of, when I tell you that the water has sometimes been known to rise 70 feet above its ordinary level, at which time the consequences are dreadful, the banks, the whole way, being seldom more than 30 feet high and the country for many thousands of acres being covered with farms, cornfields, heads of cattle and sheep. Then all is swept away, many persons are drowned: the tops of the forest trees only are seen above the water. Houses, cornstalks, and rubbish, pass over them. But still although these dangers occur almost every year yet the settlers continue in their situations and as soon as the water is fallen, if their houses be left they begin again to cultivate their lands. It is said that the crops of only a year, when saved, will pay them for the 2 years produce. The fact is that the flood is the cause of the great fertility of the soil, as the river brings down with it a vast quantity of rich mud which covers the country to a depth of several inches so that every piece of land the water reaches is as productive as the richest muck heap: the corn, principally maize, being often near 20 feet high and the stalks have been known to afford seven large cobs of corn. Another beautiful and delightful circumstance is that every house is surrounded with peach trees, which when I was there were full of ripe fruit much finer than ever you saw in England. The trees grow like apple trees and many are as large round as my body, which yet are not able to support the vast weight of fruit in their branches, so that I have seen many trees broken down by their weight of fruit. This amazing production however is almost lost in this country as the inhabitants and pigs cannot devour an hundredth part of them. Some of the settlers made cider of them, which is bad, and others run the risk

of distilling from them an ardent spirit like rum, which however is very severely punished when found out. The common way is to take the still into some unfrequented part of the forest and work it during the night. But as the Governor gives every convict a free pardon who discovers a still and as the farmers' servants are prisoners it is very difficult for them to prevent discovery. These settlers, some of them, came out from England free, and are therefore debarred from the use of spirits unless they buy it of a publican who sells it at the rate of £5 a gallon. For when a ship arrives with rum or arrack, the Governor buys it at the rate of 8/- a gallon and gives permits to the officers only to buy it who generally are suffered to purchase about 30 gallons each at the rate of 13/- a gallon. And as this is generally considered as a part of their salary, they sell at a gain to the publicans at the rate of 30/- a gallon, and they retail it for £5 or more. For a small glass of grog, such as you may buy in England for sixpence here costs half a crown. So that here when a person brings anything to sell he seldom says that he will take so much money for it but so much rum. However I have broken off my account of my jaunt to the Hawkesbury River to which I now return.

The farms about here which is the principal part of the country for cultivation are of various sizes. Most of them however are small. A free settler has generally a grant of 100 acres with two other men for 18 months to clear the place from trees. An emancipated convict has 50 acres, and a woman 30 acres. It is only the principal farmers that have a plough or horses on the land. The inferior settlers work it with spades and hoes but this is the general employment of such miserable men as are sent prisoners from England and given to settlers. The price of land varies very much. Forest land not cleared is about 10/- an acre: but when the trees are cut down it fetches 50/- or £3 an acre. I even saw an acre of land near the town of Greenhills sold for £80. In the most part a hundred acres of land half of which is cleared is worth about £250. The expense of cultivation however is very great, as a pair of ordinary horses such as you might buy for a plough in England for £40 will here fetch £200. But it is more common to see the carts and ploughs drawn by oxen which generally are worth £20 or £30 apiece. But the truth is that there is no such thing as money in the colony. If a person spends 5/- or even £100 he gives a note for it which goes about like a bank bill. In truth many of the settlers who are worth £10,000 could not at any time show you £10 in money or bills that will pass in England, and, what is more hard for them they cannot even buy the necessities of life from such merchants as come to the place, as they cannot give bills that will be honored in other countries. So that if they cannot barter, they are obliged to go without their wants or buy them from the tradesmen in the place who immediately clap 200 per cent on their goods. I have sometimes been at hovels in which settlers have lived that have been said to be worth many thousands of pounds but yet they live in huts such as the meanest inhabitant in England would not inhabit and they have nothing to offer you to drink but water.

These are my principal observations when in the interior of the country, and which I had ample opportunity of seeing during a stay of 3 weeks: for although I expected to remain at that distance from the ship only two days, yet it so happened that I even staid longer than I desired, for although the Commodore (Bligh) admitted me into his suite yet I considered myself more as an interloper than as a welcome attendant. But it so fell out, that His Excellency desired my assistance in a way that he did not expect. For it being very fine weather, he chose to get out of his coach and ride on horseback for 20 miles, and being a corpulent man and for some time unused to exercise, on the following day his legs became swollen and painful, fever came on, and he was obliged to take to his bed. By which circumstance I was compelled to remain near his person till he was able to be conveyed back again to Sydney which was three weeks and I assure you I was sufficiently tired of the job. For although he was sufficiently grateful to me for my assistance, yet on the whole he is so uncertain in his manners, so violent in his conduct, but at the same time so defiant in contradiction, that he overpowers or affrights every person that has any dealings with him, and particularly as he desires and expects all the deference and submission to be paid to him that the proudest despots covet. Since his recovery he is come on board his ship and therefore she is become as ceremonious as if commanded by an Admiral. He has since his arrival been saluted but six times by the forts and batteries, and he never leaves or comes on board the ship without having a guard of soldiers presenting arms to him, and all the officers of the ship attending with their hats off, and all this humbug must continue till we arrive in England.

<sup>1</sup> From the original in the Mitchell Library, Sydney.

## Correspondence.

### VITAMIN K AND THE RH-NEGATIVE MOTHER.

SIR: I was very interested in the papers on erythroblastosis in the journal received today, but was disappointed not to find any reference to the ante-natal treatment of the mother in the hope of protecting the baby.

For some time I have given all my Rh-negative mothers (and jaundiced babies) vitamin K—to mothers 20 milligrammes three times a day with meals from the time of making the diagnosis of pregnancy. This was because I had seen a deadborn baby with obvious internal haemorrhages lying in a pool of blood-stained liquor amnii. As vitamin K is so useful in controlling haemorrhages in purpura, the menopause, and even in post-partum and other haemorrhages, I thought it might help to protect the infant. Of course, it is not always successful, but I am sure it may be useful in milder cases.

I had an interesting experience with one mother. Her fourth child, a boy, was born in October, 1947, and became jaundiced, but did well on vitamin K except that he developed an abscess in the buttock. The mother was Rh negative, blood group A, and was aged twenty-nine years. In her next pregnancy I began vitamin tablets in February, 1952, and a little girl was born in June, 1952; she was given vitamin K injection soon after birth and developed no jaundice, but had an increasing anaemia and twice was given a transfusion of a few ounces with a considerable interval between the two. She has thrived ever since. Her sixth child was born in May, 1955; she had vitamin K from the previous November. He showed no sign of either jaundice or anaemia and has done remarkably well. In her last two labours there was a tendency to post-partum haemorrhage (not severe), worse in the later than the earlier labour. I have noticed this occurrence in other Rh-negative mothers.

I hope that some who have greater opportunities than I will test this suggestion.

Yours, etc.,  
MARY C. DE GARIS.

Geelong,  
Victoria,  
July 23, 1955.

### THE RESERPINE ANTI-HYPERTENSIVE DRUGS.

SIR: I was interested to read Dr. Swanton's letter in your correspondence column of the issue of July 2. I hasten to write confirming his experience.

About the beginning of this year I began to become disturbed by the fact that I was seeing too many people developing melancholia or severe depression while receiving reserpine. At that time no one to whom I had mentioned the matter had had any similar experience, and because of this I checked through my own cases and prepared an article which has been published elsewhere (*Lancet*, July 15, 1955).

Since then I have found two more cases of true melancholia which I believe to have been due to the drug, and have found that many others have been rendered wretched by the use of it. It is my opinion that reserpine is a drug which should be used with the greatest respect, and only in cases of severe hypertension under strict supervision. It should not be given to be taken at the patient's discretion to people with mild essential hypertension in whom simple sedation would be just as satisfactory.

Yours, etc.,  
DAVID C. WALLACE.

Latrobe Terrace,  
Geelong,  
Victoria,  
July 27, 1955.

### REGISTRATION OF FOREIGN DOCTORS IN AUSTRALIA.

SIR: A few years ago I was advised that to practise medicine in New York State, United States of America, all I would be required to do was to pass an examination. No further study was required of me other than that necessary to pass the examination. I would suggest that this practice be adopted by the registration boards of Australia in dealing

with foreign doctors. As things are at present, even the best of doctors from America and continental Europe are debarred from practising in Australia. The medical profession is almost wholly to blame for the present un-Christian state of affairs that makes labourers out of highly trained professional men.

Yours, etc.,  
New Zealand Chambers, F. W. SIMPSON, D.O. (Oxon.).  
105 St. George's Terrace,  
Perth.  
July 22, 1955.

### THE CLASSICS AND MEDICINE.

SIR: In the issue for July 30 you have an interesting annotation on the subject of "The Classics and Medicine", showing how a knowledge of the quantities of vowels can help in the pronunciation of words derived from the classics. The next annotation is on leukaemia, which, following the Americans, you are accustomed to spell as "leuchemia", making it more difficult for indifferent spellers. It might appear logical that the  $\kappa$  of  $\lambda\epsilon\upsilon\kappa\acute{o}s$  should become  $\chi$  before the aspirate (in  $\acute{\alpha}\lambda\mu\alpha$ ), as it does sometimes in Greek. However, a reference to the smaller "Liddell and Scott" brings to light one word where  $\lambda\epsilon\upsilon\kappa\acute{o}s$  is compounded with another word beginning with an aspirated vowel. It is  $\lambda\epsilon\upsilon\kappa\iota\pi\pi\alpha\iota$ , meaning "riding or driving white horses" or "famous for white horses". So perhaps the old-fashioned spelling of leukaemia is not so wrong after all.

Yours, etc.,  
J. M. A. LOWSON.

Torquay,  
Victoria,  
August 1, 1955.

[The standard adopted by this journal is that laid down by the Oxford English Dictionary, which spells the word leuchemia. It is stated that the word is less correctly leuc-, leukaemia, and the following is added: [Modern Latin, as in Greek  $\lambda\epsilon\upsilon\kappa\alpha\iota\mu\alpha$ , from  $\lambda\epsilon\upsilon\kappa\acute{o}s$  white +  $\acute{\alpha}\lambda\mu\alpha$  blood.]—EDITOR.]

### AN UNUSUAL SIDE EFFECT OF "DIGOXIN".

SIR: In reply to the letter of Dr. Clyde Davies on an unusual side effect of "Digoxin" (*M. J. AUSTRALIA*, July 30, 1955) may I be permitted to report that I first observed visual disturbances following the use of this drug in 1953.

On September 25, 1953, I saw a patient of Dr. Alan Traill, Mrs. X, aged seventy-eight years, a mild diabetic who was having "Digoxin" following a coronary occlusion. She complained of an attack of temporary blindness four months previously and when seen had pronounced visual hallucinations—a constant white scintillation in the field of vision.

On November 25, 1953, Mr. Y, a retired clergyman, aged seventy years, a patient of Dr. Figtree, complained that everything seen by artificial light looked green. He had just completed 100 tablets of "Digoxin" at the rate of two per day.

In both these patients a reduction in the dose of "Digoxin" was followed by a loss of the visual disturbance.

Since then I have seen several similar cases of coloration or dimness of vision, but did not consider the matter worth reporting, since its occurrence during the administration of preparations of digitalis is well known to ophthalmic surgeons.

Yours, etc.,  
D. SHORTRIDGE.

280 Burwood Road,  
Burwood,  
New South Wales.  
July 29, 1955.

### A BAN ON HEROIN.

SIR: I desire to inform you that a proclamation will be published in the issue of the *Government Gazette of the State of New South Wales* on Friday, July 29, 1955, appointing October 1, 1955, as the day upon which the provisions of the *Police Offences Amendment (Drugs) Act, 1954*, shall commence. This Act prohibits the manufacture, use, sale, distribution or possession of diamorphine (commonly known



as heroin), and, consequently, the ban on this drug will become effective as from October 1, 1955.

The destruction of heroin stocks is being left to individual holders, who should endorse their records as to the date on which such stocks were destroyed.

It would be appreciated if this matter could be publicized in your journal.

Yours, etc.,

C. J. BUTTSWORTH,  
Under Secretary, New South Wales  
Chief Secretary's Department.

Sydney,  
July 25, 1955.

SIR: As the date for the banning of the use of heroin draws nearer, I am becoming more and more amazed that no protest has been voiced in your columns about this political prohibition of a valuable and at times irreplaceable drug.

From correspondence in other journals it is apparent that this prohibition is at the behest of a foreign country where heroin addiction is a major problem. But is it a problem in Australia? Will our abstinence from the use of heroin diminish addiction to the drug in America? What is the gain to us, or to anyone, which will compensate for the obvious disadvantages of the ban?

I have met a few people addicted to morphine, a considerable number addicted to alcohol, and a vast multitude addicted to tobacco. We all know of the evil effects of alcohol upon its addicts and their dependants, and we are beginning to realize the dangers of tobacco. I could sympathize with an attempt to ban these things, although I am certain it will never be made, because of the voting power of the addicts and the large contributions they make to government finances. But in nearly twenty years in medical practice I have never met a heroin addict!

There may be heroin addicts in Australia, but they must be very few. I submit that their numbers cannot possibly warrant this total prohibition of the drug.

I trust, sir, that you will publish this letter, so that it will be on record that the acceptance by the medical profession of this political interference with our right to prescribe what we deem necessary for our patients has not been entirely unanimous.

Yours, etc.,

WEEKS WHITE.

98 Acacia Avenue,  
Leeton,  
New South Wales.  
July 24, 1955.

#### A CASE FOR DIAGNOSIS.

SIR: Will some member kindly shed light on the following unusual condition?

Mr. E., aged twenty-five years, is a married man with one child aged two years. He is a well-developed hard-working man in good health. He complains that he has a seminal emission accompanied by mild orgasm within a minute or so of defecation. It occurs after almost all bowel actions and has been present for the past eight years. The amount is variable. There is no penile erection and no known cause or aggravating factor.

Previous illnesses and operations include: tonsils and adenoids removed, 1936; appendicectomy, 1940; encephalitis, 1940.

I should like to mention that the diagnosis of encephalitis may have been a provisional one on admission to hospital. It does not appear to be supported by the clinical history and investigations recorded in the case history at the time.

Yours, etc.,

JOHN DYKES.

Turrumurra,  
New South Wales,  
August 4, 1955.

#### THE RÖNTGEN ORATION.

SIR: I wrote at some length in THE MEDICAL JOURNAL OF AUSTRALIA of July 2 refuting Dr. O'Day's naïve materialism and trust in science, unaided, to solve our human problems; and now I must write again, if more briefly, because in his reply of July 30 he has so misunderstood me as to rail against my supposed idealist beliefs. Let me therefore urge

him to read my letter again more carefully and understand that in rejecting any dualism I am saying that neither materialism nor idealism are tenable. We cannot understand how matter could give rise to the mind which apprehends it any better than we can conceive how mind creates matter.

These are outworn controversies anyway, and are the product of naturalistic or "object" thinking, which religious or existential inquiry and modern scientific knowledge together have done so much to refute. Instead, as Dr. Ham has mentioned in her letter of July 30, both disciplines now happily agree that matter and mind are probably interwoven and together are but one aspect of a greater reality so far unknown to us, since it probably lies in a further dimension of experience than we have attained. It is a non-rational reality beyond the limitations of science, beyond our petty reason. . . . If not, and reason was all, we could apprehend the absolute here and now and be the masters of all things. It is a reality the truth of which we experience in our own feelings and in the testimony of the centuries, however inexplicable these may be in coldly scientific terms. It is an assumption of faith.

This is what Dr. O'Day appears not to realize, though he admits to the limitations of science. With Marx, who founded his philosophy on the antipersonalism of Hegel, he holds to a belief in the classic reality of his concepts and mistakes these abstractions of thought for the realities of being—the non-rational reality which underlies concepts and abstractions and thoughts and is not amenable to rationalizing processes. The reality is preexistent to these.

The "things" of science, I admit, are "material"—or rather, we assume they are for argument's sake. The speculations of science are "ideal". Taken together they are extremely useful, and we must use them both wherever we can to improve our lot. . . . But neither are real. That is what I want to stress. Reality is of another order altogether, and can only be touched by us in religious experience or in poetry. It is not a human product; but its manifestations are. It is not primarily of our making: we are first of it.

Yet Dr. O'Day still objects that science cannot be expected to accept this view. Of course it cannot. Such a view is the manifestation of an experience beyond the realms of science to explain or accept. Such feelings are beyond science altogether. Science can sometimes answer the question "how?"; never the question "why?". And it is because the adherents of scientific materialism or of rational psychology, such as Freud, stick to science and ignore the full mysteries of life and the spirit that they are blinded to explanations which only religion can give. Misunderstanding religion, they mistrust it; mistrusting religion, they misunderstand it and distort it. They think of religion as only a superstition to be afraid of, not as a living experience to be felt and cherished. It is to open the eyes of such blind people that religion and science must be reconciled in their minds.

Finally, I must explain that I did not intend to be abusive when, here and there in my previous letter, I called my opponent naïve, blind, intolerant and subversive. I simply meant that I thought him, as I still do, naïve, blind, intolerant and subversive of the truth as I see it.

Yours, etc.,

PHILIP LANGTON-LOCKTON.

Montrose,  
Victoria,

August 8, 1955.

#### OUT OF THE PAST.

SIR: I was recently sought out and paid a forty-three-year-old medical account. Any rivals?

Yours, etc.,

MEDIC.

Sydney,  
August 4, 1955.

#### RECENT TRENDS IN THE TREATMENT OF FRACTURES.

SIR: I was most interested to read the article by E. E. Price on recent trends in the treatment of fractures in your journal. There are, however, two points which struck me very forcefully:

1. I think the use of closed skin type of plaster to be a very dangerous practice. I am sure orthopaedic surgeons have seen cases of Volkmann's ischaemic contracture of the

for arm following such treatment. I am sure in the hands of many people such plasters are quite satisfactory, but in the hands of the occasional operator they must always be considered to be dangerous.

2. I was sorry to read the comments on treatment of paraplegics. No paraplegic need die from bed sores or urinary infection in the early stages or even in the later stages if managed properly. Such patients need a specialized unit for their management, and if this is satisfactory they can easily be returned to a satisfactory economic status.

In this unit we have now discharged four people, all permanent paraplegics, but all capable of earning their daily living without difficulty and without being a social problem.

These units are well known overseas, and such information should be at hand to all general practitioners in Australia. Here in Western Australia we have an arrangement that all paraplegics in this State shall be admitted to this specialized unit, and we have already proved that such care can be both economical in time and money.

Yours, etc.,

Royal Perth Hospital,  
Perth,  
August 4, 1955.

G. M. BEDBROOK.

# RECURRENCE OF BENIGN TERTIAN MALARIA FOLLOWING INJECTION OF TUBERCULIN.

SIR: With reference to the report of a case of malarial "recurrence" following injection of tuberculin (North and Lehmann, M. J. AUSTRALIA, July 30, 1955) there are other points which call for comment.

It is not recorded how long after the first attack the patient left New Guinea; further infection may have occurred and may have been responsible for the attack described in this report.

It is considered nowadays that relapses of vivax malaria are due to the release of erythrocytic parasites from exo-erythrocytic forms in the liver; these parasites in the blood would take some time to build up to a sufficient density to cause symptoms. This density is usually higher when symptoms of a relapse appear than in the primary attack. This patient developed symptoms within a few hours which persisted and became those of the malaria relapse. There is no indication of the parasite density which would allow some assessment to be made of the duration of the parasitemia.

On the other hand, some cases were seen amongst troops during the war in whom a continuous parasitemia without symptoms followed treatment with antimalarial drugs; the soldier had developed tolerance to the parasitemia. If the present patient were in this category, any paroxysm of fever and the finding of malaria parasites in the blood would lead to the diagnosis of an attack of malaria. However, the tertian periodicity indicates that the pyrexia was due to malaria.

Mantoux tests done on malaria-infected native people in widespread areas of New Guinea do not appear to have precipitated anything unusual in the way of malaria relapses, even amongst those whose immunity or tolerance is not well established—which is, indeed, a fortunate occurrence, as many millions of Mantoux tests have been done throughout the tropical world.

Yours, etc.,

School of Public Health and Tropical Medicine,  
Sydney,  
July 29, 1955.

ROBERT H. BLACK.

## Obituary.

FRANK LLEWELLYN GILL.

THE war of 1914-1918 produced a generation of surgeons who contributed much to surgery in Australia. One of these was Frank Llewellyn Gill, who died in Perth on June 29, 1955.

Frank Gill returned from service in World War I to specialize in surgery in Perth, and for many years was an inspiration on the staff of both the Royal Perth Hospital and Princess Margaret Hospital for Children.

Before graduating in medicine, he had for a short period been a school master. When he decided on a medical career, schoolboys lost one who would have been a great master. His love of teaching was not forgotten. Frank was never happier than when teaching a small group of colleagues or resident medical officers. Many a young resident medical officer or surgical colleague can remember helpful advice he has received from Frank Gill; many a didactic statement based on his own careful observation has become a surgical aphorism. Always respectful of the knowledge of his seniors, he realized that progress would come from his juniors, and unselfish encouragement to his juniors was always his aim; he recognized ability and loved helping those worth helping.

A lover of mechanical gadgets, he spent much of his leisure time in his workshop; he maintained that every man should have a hobby, and hours spent in his workshop provided essential mental relaxation. Needing a new tool for some surgical procedure, his facile brain would produce



a beautifully turned-out instrument in a few hours. This love of gadgets was responsible for his enthusiasm for genito-urinary surgery; fascinated by the ingenious new endoscopic instruments, he quickly realized that a new field of investigation was open to him. Cystoscopy and pyelography revealed a vast number of abnormalities which appealed to his mechanical mind, and as founder of the Kidney Club, he fostered genito-urinary surgery in Western Australia.

Like all great surgeons of his generation, his field was not circumscribed; his powers covered a wide field, but he was happiest in delicately handling the fragile tissues of the very young. A lover of children, he was devoted to his work at the Children's Hospital and maintained an active interest in this institution long after his retirement from surgical practice.

Greatly conscious of his responsibilities, he took a great interest in the affairs of both the British Medical Association and the Royal Australasian College of Surgeons, of which he was a foundation Fellow. After many years of service on the Council of the Western Australian Branch of the British Medical Association he held the office of Branch President in 1935; persuasive in debate, his wise counsel contributed much to Western Australian medicine.

A lover of life, Frank Gill enriched life, stimulating, encouraging and improving all with whom he was associated.

A great man in a small community, he would have achieved greatness wherever he had lived. Men are soon forgotten, but all who knew him will remember his many kindnesses, his brilliance, his helpfulness and, perhaps most of all, his love of perfection; his standards were high—an example to all who follow him. A man devoted to his family, he leaves a widow and daughter, to whom we extend our sincere sympathy.

#### EMIL HUTH.

Dr. G. S. SANTOW has sent the following appreciation of the late Dr. Emil Huth.

Dr. Emil Huth died on March 15 this year, after a short illness, at his home in Rose Bay.

He was born fifty-six years ago in Vienna, and as a young man of eighteen, enlisted to take part in World War I. He was a good soldier and was demobilized as a lieutenant, having been decorated with the great silver and also the gold medal for bravery—the highest such decoration awarded in the Austro-Hungarian army. Having completed his studies at the medical faculty of Vienna, he spent four years as an intern at the *Allgemeines Krankenhaus* and later became medical superintendent at the Volk Sanatorium, in Mauer, near Vienna. The year 1937 forced Dr. Emil Huth to leave his country, and, fleeing from Hitler just after the invasion of Austria, he came to settle in Sydney. As soon as the *Medical Act* allowed him to enrol as a medical student, in fourth year, he did so, and, after completing three years' prescribed study, qualified a second time, this time as an M.B., B.S. (Sydney), in 1945.

These are the external stations of Emil's worldly wanderings. Behind these few facts lived a man who was recognized by his foreign-born colleagues as one of the most distinguished: a physician who practised medicine among human beings rather than amongst diseased concepts, always intensely interested in the whole personality, the background and the soul of his patients. In the rush and bustle of Sydney medical ways, he still managed an unhurried full hour for each new patient and not much less for those he considered he knew already. Having suffered indifferent health for almost fifteen years, he could not allow himself to visit all those who would have wanted him to do so. Instead, people made a track to his door in Rose Bay from all over Sydney and from the country towns and stations of the whole State.

Huth had the uncanny gift of easing the burden of troubled minds, of dispelling anxiety, and of enabling his patients to leave some of their burdens behind them in his consulting room. Emil Huth was a good doctor and a kind-hearted person, intensely interested in the welfare and fate of those who came to him. He never turned down anyone who could not be made whole physically; these were the people who clung to Emil and who benefited most by the generous dispensation of hope and strength that flowed from the man.

He left behind a great many bewildered sick, who will miss him sorely; also a widow and two daughters, and a desk brimming over with case histories—nothing else.

### Naval, Military and Air Force.

#### APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 32, of July 7, 1955.

#### NAVAL FORCES OF THE COMMONWEALTH.

##### Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

*Transfer to the Emergency List.*—Surgeon Commander (Acting Surgeon Captain) Charles Anthony Downward, D.S.C., is transferred to the Emergency List and reappointed for temporary service, dated 11th June, 1955.

##### Citizen Naval Forces of the Commonwealth.

##### Royal Australian Naval Reserve.

*Appointment.*—George Ronald Thoms is appointed Surgeon Lieutenant, dated 12th May, 1955.

#### AUSTRALIAN MILITARY FORCES.

##### Australian Regular Army.

##### Royal Australian Army Medical Corps.

*To be Temporary Major, 9th May, 1955.*—1/8062 Captain J. K. O'Reilly.

##### Citizen Military Forces.

##### Northern Command.

*Royal Australian Army Medical Corps (Medical).*—1/61890 Captain (provisionally) A. L. Proctor relinquishes the provisional rank of Captain and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Northern Command) in the honorary rank of Captain, 29th July, 1954. *To be Temporary Major, 26th May, 1955:* 4/31996 Captain M. W. Elliott. The provisional rank of 1/61819 Captain J. K. Fullagar is terminated, 7th August, 1954. *To be Captain (provisionally), 8th August, 1954:* 1/61819 John Keisham Fullagar. *To be Captain (provisionally), 26th May, 1955:* 1/39184 Graham Bell Cavaye.

##### Eastern Command.

*Royal Australian Army Medical Corps (Medical).*—The provisional ranks of the following officers are confirmed: Captains 2/206956 G. L. McDonald and 2/206958 W. R. M. Shaw. 2/146605 Captain (provisionally) D. G. Seaton relinquishes the provisional rank of Captain and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Eastern Command) in the honorary rank of Captain, 25th March, 1955.

##### Northern Territory Command.

*Royal Australian Army Medical Corps (Medical).*—4/31965 Captain R. R. A. Brock relinquishes the provisional rank of Major, 14th May, 1955. *To be Major (provisionally), 15th May, 1955:* 4/31965 Captain R. R. A. Brock.

#### RESERVE CITIZEN MILITARY FORCES.

##### Royal Australian Army Medical Corps.

*Northern Command.*—*To be Honorary Captain, 23th May, 1955:* Joan Cochran.

*Southern Command.*—*To be Honorary Captain, 25th April, 1955:* Thomas George William Baker.

### Post-Graduate Work.

#### THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

##### Annual Subscription Course.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that the following seminar and lectures will be given by W. S. C. Copeman, O.B.E., M.D., F.R.C.P., physician-in-charge of the Department of Rheumatic Diseases at the West London Hospital and chairman of the Empire Rheumatism Council:

Friday, September 9: 1.15 p.m., seminar in the Scott Skirving Lecture Theatre, Royal Prince Alfred Hospital, "The Practical Management of Rheumatoid Arthritis during the Administration of Steroid Hormones".

Wednesday, September 14: 8.15 p.m., lecture in the Stawell Hall, 145 Macquarie Street, "The Differential Diagnosis of the Rheumatic Diseases". (Members are asked to note that this lecture was originally arranged for 8.15 p.m. on Tuesday, September 13.)

Thursday, September 15: 8.15 p.m., lecture in the Stawell Hall, 145 Macquarie Street, "Treatment of Gout and Osteoarthritis".

##### Course in Rheumatic Diseases.

A course in rheumatic diseases will be held from Friday, September 9, to Thursday, September 15, to coincide with the visit to Sydney of Dr. W. S. C. Copeman, who will be guest speaker. The programme is as follows:

Friday, September 9: 1.15 p.m., "The Practical Management of Rheumatoid Arthritis during the Administration of Steroid Hormones", Dr. W. S. C. Copeman (Royal Prince Alfred Hospital).

Monday, September 12: 4 to 5.30 p.m., clinical conference, Dr. W. S. C. Copeman and staff of the Arthritis Clinic, Royal Prince Alfred Hospital.



Wednesday, September 14: 4 to 5.30 p.m., clinical conference, Dr. W. S. C. Copeman and staff of the Arthritis Clinic, The Royal North Shore Hospital of Sydney; 8.15 p.m., "The Differential Diagnosis of the Rheumatic Diseases", Dr. W. S. C. Copeman (Stawell Hall).

Thursday, September 15: 4 to 5.30 p.m., clinical conference, Dr. W. S. C. Copeman and staff of the Arthritis Clinic, Royal South Sydney Hospital; 8.15 p.m., "Treatment of Gout and Osteoarthritis", Dr. W. S. C. Copeman (Stawell Hall).

Fees for attendance are £2 2s. for members of the annual subscription course and £3 3s. for non-members. Written application, enclosing remittance, should be made to the Course Secretary, The Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney. Telephones: BU 4497-8. The closing date for applications is September 2, 1955.

The annual subscription course covers attendance at lectures by overseas visiting lecturers and other specially arranged activities. The annual fee is £2 2s. from July 1. The fee for resident medical officers is £1 1s. A diary card setting out details of lectures and activities is published and sent to members at regular intervals.

#### Lecture at Balmoral Naval Hospital.

On Tuesday, September 13, 1955, at 2 p.m., Dr. F. Hales Wilson will lecture on "Anæmias" at the Balmoral Naval Hospital. This lecture is open to all medical practitioners.

#### Week-End Course.

The following week-end courses will be held during September.

##### Albury.

The Post-Graduate Committee in Medicine, in conjunction with the Border Medical Association, will hold a week-end course at the Albury Base Hospital on Saturday and Sunday, September 3 and 4, 1955. The programme is as follows:

Saturday, September 3: 2 p.m., registration; 2.30 p.m., "Disease of the Prostate and its Treatment", Dr. M. S. S. Earlam; 4 p.m., "Fractures of the Leg", Dr. G. S. Colvin.

Sunday, September 4: 9.30 a.m., "Hypertension", Dr. B. C. Sinclair-Smith; 11 a.m., "Chronic Cystitis and Chronic Pyelitis", Dr. M. S. S. Earlam; 2.30 p.m., "Orthopaedic Prob-

lems in Babies and Young Children", Dr. G. S. Colvin; 4 p.m., "Coronary Disease", Dr. B. C. Sinclair-Smith.

The fee for attendance at the course will be £3 3s., and those wishing to attend are requested to notify Dr. B. Twomey, Honorary Secretary of the Border Medical Association, 1095A Mate Street, Albury, as soon as possible.

##### Taree.

The Post-Graduate Committee in Medicine, in conjunction with the Eastern District Medical Association, will hold a week-end course at Taree on Saturday and Sunday, September 10 and 11, 1955. The programme is as follows:

Saturday, September 10: 2.15 p.m., registration; 2.30 p.m., "Intestinal Obstruction", Dr. V. J. Kinsella; 4 p.m., "Recent Advances in Therapy", Dr. A. W. Morrow.

Sunday, September 11: 9 a.m., annual meeting; 10.30 a.m., "Ulceration of the Alimentary Tract", Dr. A. W. Morrow; 11.30 a.m., "Post-Operative Management", Dr. V. J. Kinsella.

Fee for attendance at the course will be £3 3s., and those wishing to attend are requested to notify Dr. Angus McNeill, Honorary Secretary of the Eastern District Medical Association, River Street, Kempsey, as soon as possible.

Lecture times at Taree are subject to alteration.

## Notice.

#### THE CIBA FOUNDATION AWARDS.

A PANEL consisting of Professor C. H. Best (Toronto), Professor E. J. Conway (Dublin), Professor G. W. Corner (Baltimore), Professor A. Haddow (London), Professor V. R. Khanolkar (Bombay), Professor R. Nicolaysen (Oslo), Dr. A. S. Parkes (London) and Professor F. G. Young (Cambridge), with Dr. E. Braun-Menéndez (Buenos Aires) as a corresponding member, has considered 51 papers from 17 countries for the Ciba Foundation's awards for 1954-1955

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED JULY 30, 1955.<sup>1</sup>

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory. <sup>2</sup>	Australian Capital Territory.	Australia. <sup>3*</sup>
Acute Rheumatism .. ..	7(7)	4(2)	3(2)	..	1(1)	..	..	..	15
Amoebiasis .. ..	..	..	..	..	..	..	..	..	..
Ancylostomiasis .. ..	..	..	1(1)	..	..	..	..	..	1
Anthrax .. ..	..	..	..	..	..	..	..	..	..
Bilharziasis .. ..	..	..	..	..	..	..	..	..	..
Brucellosis .. ..	..	..	..	..	..	..	..	..	..
Cholera .. ..	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus) .. ..	1(1)	1(1)	..	..	..	..	..	..	2
Dengue .. ..	..	..	..	..	..	..	..	..	..
Diarrhoea (Infantile) .. ..	2(2)	7(6)	5(5)	..	1	..	..	..	15
Diphtheria .. ..	2(2)	8(4)	7(1)	..	7(6)	..	..	..	24
Dysentery (Bacillary) .. ..	..	2(2)	..	..	..	..	..	..	2
Encephalitis .. ..	..	2(2)	1	..	..	..	..	..	3
Filariasis .. ..	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice .. ..	..	..	..	..	..	..	..	..	..
Hydatid .. ..	..	..	..	..	..	..	..	..	1
Infective Hepatitis .. ..	48(18)	78(37)	..	19(10)	6(1)	..	..	..	151
Lead Poisoning .. ..	..	..	..	..	..	..	..	..	..
Leprosy .. ..	..	..	..	..	..	..	..	..	..
Leptospirosis .. ..	..	..	7	..	..	..	..	..	7
Malaria .. ..	..	..	1(1)	..	..	..	..	..	1
Meningococcal Infection .. ..	8(4)	5(5)	1	..	..	..	..	..	14
Ophthalmia .. ..	..	..	..	..	..	..	..	..	..
Ornithosis .. ..	..	..	..	..	..	..	..	..	..
Paratyphoid .. ..	..	..	..	..	..	..	..	..	..
Plague .. ..	..	..	..	..	..	..	..	..	..
Poliovirus .. ..	1	2(1)	3	2(2)	..	..	..	..	8
Puerperal Fever .. ..	..	..	2	..	..	..	..	..	3
Rubella .. ..	..	26(21)	..	1(1)	6(6)	..	..	..	35
Salmonella Infection .. ..	..	..	..	..	..	..	..	..	1
Scarlet Fever .. ..	11(8)	11(10)	29(5)	5	2(2)	..	..	..	58
Smallpox .. ..	..	..	..	..	..	..	..	..	..
Tetanus .. ..	..	..	..	..	..	..	..	..	..
Trachoma .. ..	..	..	..	..	17(1)	..	..	..	17
Trichinosis .. ..	..	..	..	..	..	..	..	..	..
Tuberculosis .. ..	30(24)	13(8)	5	5(4)	8(6)	4(1)	..	1	66
Typhoid Fever .. ..	..	..	1	..	..	..	..	..	1
Typhus (Flea-, Mite- and Tick-borne) .. ..	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne) .. ..	..	..	..	..	..	..	..	..	..
Yellow Fever .. ..	..	..	..	..	..	..	..	..	..

<sup>1</sup> Figures in parentheses are those for the metropolitan area.

<sup>2</sup> Figures not available.

<sup>3</sup> Figures incomplete owing to absence of returns from Northern Territory.

for research relevant to the problems of aging, and the following awards have been made (the names of leading authors only are given): S. M. Friedman (University of British Columbia), an award of £400; E. M. Hartsook (Pennsylvania State University), M. M. Hoffman (McGill University), J. E. Lovelock (National Institute for Medical Research, London) and H. Sobel (Cedars of Lebanon Hospital, Los Angeles), each £250; W. Hobson (Sheffield University) and E. Geiringer (Glasgow Hospital for Sick Children), each £100. It was decided to repeat the offer of the awards for the year 1955-1956, and an announcement of the conditions will be made shortly.

#### CONFERENCE ON RADIATION BIOLOGY.

UNDER the auspices of the Cancer Institute Board and the Anti-Cancer Council of Victoria, a conference on radiation biology will be held at the Cancer Institute, 483 Little Lonsdale Street, Melbourne, from December 12 to 16, 1955. Professor W. V. Mayneord, of the Institute of Cancer Research, Royal Cancer Hospital, London, and Dr. F. G. Spear, of the Strangeways Laboratory, Cambridge, will deliver lectures at the conference.

#### CLINICAL EVENING AT HORNSBY AND DISTRICT HOSPITAL.

A CLINICAL EVENING will be held at the Hornsby and District Hospital on Friday, September 9, 1955, at 8.30 p.m. Two films will be screened: "The Intervertebral Disk and Sciatic Pain" (with comments by H. Barry, F.R.C.S.) and "Gastro-Intestinal Cancer: Problems of Early Diagnosis" (with comments by H. Cumberland, F.R.C.S., F.R.A.C.S.). All members of the British Medical Association are invited.

#### QUEENSLAND MEDICAL WOMEN'S SOCIETY.

It has been decided by the Queensland Medical Women's Society to establish a prize in memory of the late Dr. Jean and Dr. Joyce Stobo, to be awarded to the woman student who gains first place amongst the women students in final year medicine at the University of Queensland. Donations should be made out to "The Stobo Fund", and addressed to the Honorary Treasurer, Dr. Marie Horn, 137 Wickham Terrace, Brisbane.

#### PRESENTATION OF PORTRAIT TO MAJOR-GENERAL F. K. NORRIS.

DURING Congress week, Major-General F. Kingsley Norris will be presented with a portrait of himself, as a token of appreciation for his services as Director-General of Medical Services of the Australian Army. This function will take place in the Stawell Hall, 145 Macquarie Street, Sydney, on Monday, August 22, 1955, at 4.30 p.m. All who are interested are invited to attend this ceremony, particularly those who served in the army with General Norris, either overseas or in Australia.

#### Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Bowie, Marion Louie, M.B., B.S., 1954 (Univ. Sydney), 16 Elizabeth Parade, Lane Cove.

McGovern, Kenneth Francis, M.B., B.S., 1953 (Univ. Sydney), "Eloura", Phillip Street, St. Mary's.

#### Deaths.

THE following deaths have been announced:

RAIL.—Wilton Henry Francis Rail, on July 17, 1955, at Melbourne.

PETERS.—Albert Lewis Julius Peters, on July 18, 1955, at Melbourne.

MCMEEKIN.—Ralph Parker McMeekin, on July 20, 1955, at Melbourne.

GOLDSMID.—Joseph Albert Goldsmid, on August 6, 1955, at Brisbane.

#### Diary for the Month.

AUG. 18.—New South Wales Branch, B.M.A.: Clinical Meeting.

AUG. 23.—New South Wales Branch, B.M.A.: Ethics Committee.

AUG. 24.—Victorian Branch, B.M.A.: Branch Council.

AUG. 25.—New South Wales Branch, B.M.A.: Branch Meeting.

SEPT. 6.—New South Wales Branch, B.M.A.: Organization and Science Committee.

SEPT. 7.—Victorian Branch, B.M.A.: Clinical Meeting.

SEPT. 7.—Western Australian Branch, B.M.A.: Branch Council.

#### Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all contract practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

#### Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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